

低碳城市建設中社區居民參與的現狀與影響 因素的分析

—以中國大陸青島市城陽區為例

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摘要

由工業污染、能源危機和交通惡化所構成的環境問題正困擾著中國大陸的城市化進程，在這樣的社會背景之下，以「可持續發展」為核心理念的低碳城市發展模式越發受到世人的重視，而低碳發展的落腳點應該是城市中各社區的低碳化轉型。社區居民參與在低碳城市發展中扮演著關鍵性的角色，相關的理念和經驗對中國大陸的低碳可持續發展具有重要的借鑒意義。因此，筆者通過對於青島市低碳示範區域—城陽區的實證研究，以問卷調查為主要方法，分析了當地在低碳社區參與方面的現狀，探究了影響參與的各種因素和機制，從而總結其成功經驗與不足之處。

結合Logistic回歸分析方法的結果可以發現，各自變量在不同的情境之下所呈現的影響程度存在差異，而居民的低碳行動也表現出被動參與型和理性參與

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型的不同特徵。筆者進一步借助統計資料和城市社會學相關理論的闡釋，在本文結論中指出大陸的城市居民具有較高的低碳意識，但其積極性和參與水準相對於發達國家而言尚處於較低的層次。此外，社區低碳事務的主導權大多由政府掌握，社區組織在低碳轉型中的缺位現象比較嚴重，內部參與途徑也並不廣泛，筆者對引發上述問題的深層原因進行了探討。最後，在對策與建議部分，主要從培育社會的低碳文化、政府部門轉變職能、完善社區激勵制度、支持公民社會力量的發展、審視消費主義的隱憂等方面提出了改進我國社區居民參與低碳城市進程的幾點想法，這同時也是創新城市管理模式的應有之義。

關鍵詞： 低碳城市、社區居民參與、影響因素、政府規劃、公民社會

1. Background and Purposes

Urbanization as well as its impact has become one of the crucial research topics in contemporary Mainland China. According to figures released by the National Bureau of Statistics (2014), the level of urbanization has reached 53.73%, which indicates the initial formation of an urbanized country. J. Stiglitz once thought highly of Chinese urbanization as one of the most expectant events during 21st century, which is on equal terms with American high-techrevolution. However, the pace of ‘urban China’ might not be as smooth as it was predicted to be. Recently, issues regarding industrial pollution, energy crisis as well as traffic congestion have been in the limelight of public opinion, which intensely plague the well-being of urban development in China. Embedded in the context of globalization, China’s government has accepted the ‘low-carbon’ tenet consisting of sustainability, livability and ecological civilization originating from successful initiatives in ‘developed’ countries such as UK and Denmark. Generally speaking, the cooperation amongst a wide range of parties especially the participation of communities and citizens, as can be seen from world-famous low-carbon metropolises, maintains the long-term vitality of a low-carbon city.

Since 2008, over 100 Mainland Chinese cities in 13 provinces have launched the construction of the low-carbon city, as can be seen from the slogan ‘Better city, better life’ of Shanghai Expo 2010. In the year of 2014, two years following 18th China’s Communist Party’s National Congress where the notion of ‘ecological civilization’ was formulated, the obsolete ‘treadmill of production’ model is shifting towards a fresher and more specialized paradigm ‘environmental governance’ (Li and Lang, 2010:45) which is reckoned as apparently drawing on successful experience from emerging low-carbon cities aforementioned. Among these cities, Qingdao has stood out as the most exemplary case. This city has been entitled ‘Chinese sustainable and livable city’ and invested in by Asian Development Bank. In Durban 2011, Qingdao became the only representative of Chinese cities to participate in the bilateral talks on environmental policies and actions. According to a local government report, the city’s energy consumption rate in the year 2015 will have declined by 17% compared to that in 2010. In addition, the pollutant cap control and percentage of forest coverage are also expected to experience a significant

improvement (Qingdao Municipal Government, 2012). In terms of its urban policy objectives, Qingdao is on its way to achieve the development goals of a low-carbon city.

Regardless of the economic and governmental efforts, the implementation concerning community residents' participation and their low-carbon lifestyle remains unclear in news reports and articles. Through this empirical research, the writers aim to investigate the current situation of community participation in Qingdao by: examining its low-carbon demonstration district, exploring the current situation and influence factors related to this participation, and identifying its successful experiences as well as the weaknesses. Through in-depth sociological research of low-carbon policies, practices, and participation with the case of Qingdao, this research is expected to provide evaluative insights about the broader impacts of low-carbon urban policies and lifestyles in Chinese cities.

2. Theoretical Framework (Literature Review)

The concept 'low-carbon' was early proposed in the British energy white paper *Our Energy Future: Creating a Low-carbon Economy* which aimed to cope with the impact of climate change and secure energy safety, consequently prompting economic and social transformation towards a more effective and efficient pattern. By implementing the 'low-carbon' development, more job opportunities and much higher life quality would be created and achieved (Department of Energy and Climate Change, 2003).

2.1 Review on the theories and research of low-carbon city

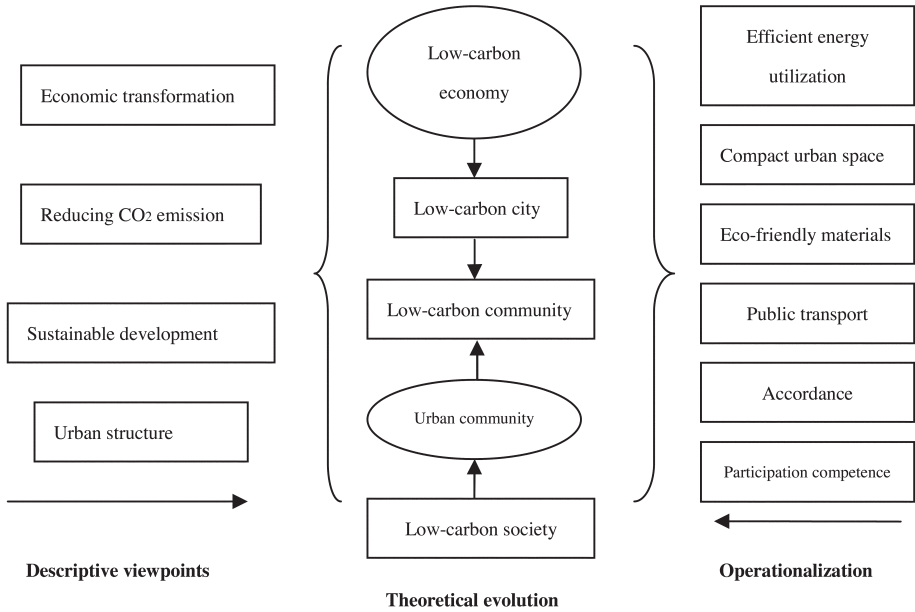
Since year 2007, the topic regarding development patterns and paths of low-carbon city has been widely discussed (Dai, 2009:7-10). Accordingly, both 'western' and Chinese scholars have made impressive research on this area. In this section, I aim to firstly review the concepts of low-carbon city, and then summarize various researches on low-carbon city development in China.

2.1.1 Definition and concept of 'low-carbon city'

'Low-carbon city' is the interpretation and extension of 'low-carbon' concept. The

understanding of ‘low-carbon city’ concept was initially on the basis of ‘low-carbon economy’, i.e. low-carbon economy is developed in urban space. During these years, its concept has extended to the area of societal life. In 2007, the project of ‘low-carbon society’ was established in Japan with the aim of transforming consuming ideas and lifestyle, advocating the thrifty spirit, implementing low-carbon technology and new systems to reduce greenhouse gas emission (Gomi et al, 2007: 128-129). In fact, the intention of ‘low-carbon society’ is quite similar to the definition of ‘low-carbon city’. Boonekamp (2006:136-137) made the delimitation with the perspective of production and energy. He argued that low-carbon city development is achieved by the means of production, transportation, building and consumption. Moreover, measures like governmental subsidy and tax exemption should be carried out to popularize renewable energy and low-carbon technology.

Meanwhile, Chinese scholars have also made fruitful theoretical discussion on the concept of ‘low-carbon city’. Zhang and Shen (2011:32-38) made a definition with a comprehensive viewpoint. They argued that low-carbon city is a branch of ‘ecological city’. It is a sustainable urban development pattern situated in urban space, with the character of ‘green economy’. Comprehensive guidance including policy-making, energy utilization, industrial innovation and urban planning should be implemented in order to guarantee the effectiveness of development. Dai (2009:7-10) proposed the definition with the aspect of ‘subject’ that low-carbon city is a type of city where urban economy is dominated by low-carbon industry and production, citizens are in accordance with the idea of low-carbon life, and government carries out the construction oriented by the blueprint of ‘low-carbon society’. Liu et al (2009:1-7) deemed with more emphasis on life quality that low-carbon city is the mode of city construction and the way of social development. It is aimed at changing economic pattern, consuming ideas and lifestyle whilst ensuring better public life standard. In addition, Huang and Ge (2010:71) operationalized ‘low-carbon city’ into different indicators which are combined with the perspective of community, namely efficient energy utilization, compact urban space, eco-friendly building materials, convenient public transportation as well as walking system in priority, accordance between low-carbon consciousness and lifestyle of community residents, and effective public participation competence.



2.1.2 Understanding of ‘low-carbon city’ from an urban sociological perspective

Even though ‘low-carbon’ is an emerging terminology within the decade, its origin and ‘essence’ can be found in the classical sociological writings, namely the past urban planning visionaries such as R.E Park’s ‘human ecology’, Aldo Leopold’s ‘land ethic’, and Lewis Mumford’s ‘garden city’. Despite their different academic perspectives and tendencies, these classical urban sociologists had unanimously emphasized that environmental and social issues are inextricably linked, rather than just focusing on ‘environmental planning concerns having to do with the quality of air, water, and natural ecosystems’ (Wheeler, 2006:286-89).

Over the past decades, inheriting talents and insights from the previous generation, contemporary theorists and planners have further flourished the concepts of ‘low-carbon’, which eventually brought about the birth of this brand-new development dimension. As a whole, a ‘low-carbon’ city comprises two main characteristics, i.e. sustainable and livable. Regarding the term ‘sustainable’, it entered the mainstream globally thanks to the UN ‘Earth Summit’ conference in 1991, after which ‘sustainable city’ programs emerged

in many parts of the world. By far, a great many experts have committed themselves to the definition of sustainable development, such as ‘development that meets both two generations’ needs’ of Brundtland Commission and ‘improving the quality of human life while living within the carrying capacity of supporting systems’ presented by the *World Conservation Union 1991*. Whereas it is rather problematic to define the notions of ‘needs’ and ‘carrying capacity’, let alone other description focusing on ‘ecological capital’ (e.g. David Pearce’s argumentation about environmental assets). In order to avoid the endless debates on certain academic terms, Wheeler (2006:286-289) moved instead towards a relatively unsophisticated and process-oriented definition stressing the point of long-term systemic welfare: ‘Sustainable development is development that improves the long-term health of human and ecological systems’. We intend to apply Wheeler’s delimitation to conduct our own research.

As for ‘livable’ which indicates people’s subjective reactions to living environment, widespread agreement on how to make cities livable is reached that elements such as ‘a healthy environment, decent housing, safe public places, uncongested roads, parks and recreational opportunities, vibrant social interaction’ (Wheeler, 2006:286-289) should be included into final evaluation indicators. Obviously, such elements also contribute to urban sustainability. I will argue in this project that the discussion above on ‘sustainable’ and ‘livable’ is insufficient for addressing the themes of the low-carbon city. Instead, the two crucial components not only constitute the concept of ‘low-carbon’, but lay a robust foundation for public sphere in the post-industrial world, namely the theme of ‘sustainability of life’. It is no longer enough to lead our life to an automobile-oriented and uncoordinated way, lacking in public squares, parks, libraries, local fitness centres that all refer to the dearth of community vitality and a sense of belonging. Joel Kotkin (2011:10-11) argued in his treatise *The City: a Global History* that a great city is capable of providing the wandering population with various recreations, but most importantly, responsible and passionate citizens are the bedrock of urban development since their personal benefits are inextricably linked with the fate of this city. Finally, there must be a commonly-shared recognition or identity that combines the whole city dwellers together. Such a perspective coincides with R.E Park’s idea that the city is a state of mind, an entity that includes distinctive customs, freedom of thoughts as well as vivid emotions

(Park, 1987:30-32). Consequently, these notions raise the significance of community participation in maintaining urban sustainability and livability in the long run.

2.1.3 Research on low-carbon city development in Mainland China

In recent years, low-carbon empirical research has gradually prospered, with the foundation of urban community. Chinese scholars carried out their research from viewpoints of system theory, low-carbon city planning, subject of urban development and related measures. Their main conclusions are outlined as below:

(1) Fu and Wang (2008:5-7) argued that the system of a low-carbon city is unique as its openness and diversity. If any subsystem changes, others would be exerted both in the short and long term.

(2) Gu (2009:25-27) suggested that low-carbon city planning should be the basic strategy and effective protection of low-carbon transformation. Thus, the rational distribution and utilization of urban resources would be coordinated by this kind of planning.

(3) Fan (2009:160) put emphasis on governmental guidance and administration which are efficient for the low-carbon policy-making. Moreover, he studied on the ‘subject’ of development and suggested that constant efforts should be adopted to coordinate government, citizens and the market. With the cooperation of different parties, the long-term effectiveness could be expected within a low-carbon city.

(4) Zhang (2009:12-14) combined low-carbon city with low-carbon life and proposed various related measures, such as green transport, eco-friendly buildings and low-carbon public consumption. In addition, he argued that the most important way to popularize ‘low-carbon’ concept is to cultivate ‘low-carbon culture’ within a city rather than technology or economy.

As a whole, the issue of Chinese low-carbon city is mostly discussed in the area of economics, politics, environics and urban planning whilst it is relatively scarce to be found in sociological literature. However, it is argued that the research above have related to the topic of ‘community participation’, especially the formation of low-carbon culture, subject of development and low-carbon consuming behaviour. These perspectives have

provided insightful lenses for conducting our empirical investigation.

2.2 Review on the theories and research of community participation

In terms of community participation during the low-carbon transformation which is exactly the research theme, I am going to conduct the review in three aspects, i.e. connotations of community participation, forms and mechanisms, and its practices and experience in world-famous low-carbon cities.

2.2.1 Connotations of community participation

The concept of ‘community participation’ was early found in the UN report ‘Improving social progress through community development’ (1955) which claimed that it is equally important with changing residents’ attitude and promoting material conditions. The intention of community development can be achieved by advocating public involvement and improving local administrative efficiency.

Chen (2009) once made a definition of ‘community participation’ that community residents not only act as the ‘object’, but as the ‘subject’ of community governance. By taking part in public activities and addressing community issues, the environment and life quality within a community would be greatly enhanced.

From a sociological perspective, a clear historical inheritance can be outlined with the connotation of community involvement. Since D.W Bartlett advocated his planning of ‘the better city’, suburbanization and separation had become the mainstream in urban development of developed countries. Even though Lewis Mumford (2011) put blame on this ‘anti-city’ trend and argued that suburb is the opposite side of city which is being transformed from a creative centre into ugly, sprawl and scattered clusters, it could not hold back the proliferation of suburbs and satellite cities. Accordingly, he suggested that human scale as well as life orientation should be integrated into a city with the aim of ‘local regeneration’, which can be perceived as the origin of community involvement. Afterwards, Jane Jacobs (2006:115-120) put forward ‘daily ballet’ to describe the residents’ interaction in a lively inner-city community. She believed that diversified community activities create the vivid public sphere and also establish the social solidarity of a neighbourhood. Daniel. A. Coleman (2006:220-221), from a pragmatism viewpoint,

suggested that participants carry out the ‘neighbourhood design’ based on the common view whilst they adequately consider the combination of shared and private space (e.g. shared kitchen, library, nursery and daily appliances). As a result, it saves the living costs and resources, also making the best use of various equipments. From the perspectives above, it is argued that the importance of public space is highlighted in community participation. Public space is not only the spatial carrier, but also an important mechanism of residents’ involvement.

Since 1990s, the previous ‘unit community’ had been disorganized due to the market-oriented reform in China. Consequently, citizens have changed their status from ‘tenants’ to ‘proprietors’ whilst community has emerged intrinsically. Huang (2010:12) argued that community participation is an indispensable part of the community construction because local residents who are quite familiar with the surroundings have more ideas of utilizing resources and conserving environment than outsiders. With their collective wisdom for a more livable space, the demand of residents can be fulfilled in maximization. Middlemiss and Parrish (2009:7559-7566) further explored the individual interaction. He deemed that self-behavior pattern can be transformed by encouraging community members and then affecting others, with the aim of improving the whole environment. In addition, Huang and Dai (2011:42-45) put emphasis on the ‘subject’ of organization. They suggested that various organizations such as home-owners’ association, residents’ committee, fellow meeting (traditional) and NGOs (modern) should make a difference. However, the residents’ committees still the organizational subject of community participation in contemporary China.

2.2.2 Forms and mechanisms of community participation

W. H. Whyte’s (2006:121-123) research on ‘public space’ such as parks and plazas aroused much attention to this mechanism. He argued that the city should be lively and a little noisy rather than well-planned whilst much more public places need to be designed. Since the rise of new urbanism, suburbanization has been drastically criticized. The leaders of this movement, Duany and Zyberk (2000:150-160), argued that constant efforts should be taken to integrate neighbourhood, district and the corridor (connector and separator). Urban forms could be transformed into small, polymorphic and interactive

ones. An ideal neighbourhood is to advocate public transportation and green space, besides walking from the community centre to its borders should be within 5 minutes. These ideas exactly refer to the core themes of 'low-carbon' lifestyle. Stephen Wheeler also highlighted the role of community participation and involvement. He put emphasis on the 'creation of more functional, local and regional democracy', especially the far-sighted leadership of officials at several levels of government which can ensure the decision-making with sustainability. It is argued that what Wheeler described is the senior level of community involvement, namely a collective grassroots democracy surpassing basic cognition, individual behaviour and governmental planning.

As for Chinese research, it can be outlined as three aspects concerning participation in public space, exploration on influence factors and mechanism design. Firstly, participation in public space consists of public discussion, public order and public service. Ma (2005:29-33) argued that there are three stages of public discussion including low-level (complaint), mid-level (home-owners' association) and high-level (professional committee with the objective of local democracy). Dai (2010:90-93) deemed that public service provides convenience and belongingness to residents, especially the elder group who would enhance the frequency of interaction by cultural activities.

Secondly, numerous factors that might affect community participation have been explored respectively. Such factors can be summarized as benefits and systems (Li, Li, and Gao, 2011:117); social belongingness and stratification (Liu and Zhang, 2010:59-60); gender, age, information source, education level, personal background, and public facilities in a community (Ma, 2005:29-33). The impact of these factors might differ in different kinds of public involvement. For instance, regarding public discussion, social stratification and economic condition have a strong positive influence. As for public service, residents with higher education level and self-identity are more inclined to take part in. Peng (2009:42-48) argued that community participation with low passion, non-political affairs, more passive behaviour and government-dominant situation are generally found according to different investigations. She attributed the phenomenon to policy-omission, misplacement between community and government, and weakness of social capital.

Finally, in terms of the mechanisms, Huang and Dai (2011:42-45) deemed that

regardless of the prosperity of Chinese NGOs, the expected improvement of participation has not yet emerged. In addition, many suggestions have been made to convert the current situation. For instance, Dai (2011:66) proposed to diversify the function of NGOs and decentralize the residents' committee. Meanwhile, members with high education level could be encouraged to organize professional counseling groups which aim to make more scientific decisions. However, Li (2008) disagreed with the 'decentralization' that it is still immature with public participation mechanisms. Thus, the 'top-down' pattern of governmental planning should remain the leading role in the current period, which can guarantee the institutional implementation and facilities improvement. In addition, the discussions on such mechanisms are concerned with the topic of 'state-society relationship'. The theory of 'civil society' has been occupying the dominant position, which emphasizes the character of binary opposition between state and society. However, this tension is not in accordance with the reality in developing countries especially China where the development paths of civil society have been restrained for a long time. Therefore, I tend to agree with the idea of 'state in society' which puts forward the argument that different sections of the state always link with various groups of society, and their behaviours are interactive with each other (Migdal,1994:100-111). During the process of Chinese social transition, it is still powerful with the leadership of state and there is not yet an emerging social force which is independent from state. It is argued that this is a proper perspective to explore the community participation in contemporary China.

2.2.3 Practices and experience of community participation

Many world-famous low-carbon cities have advanced in the aspect of community participation. This topic was discussed in our journal article *The International Experience of the Community Participation of Low-carbon City*, which has been just published in early this year (Sun and Zhang, 2014:56-58). In brief, we have examined the practices in three cities namely London, Copenhagen and Curitiba. London is famous for its public transportation system and various green places, which are available for citizens walking, chatting and sporting. The 'lighthouse projects' proposed by Copenhagen government are dedicated to building a 'city of bicycles' (Sentence, 2009:397-401), meanwhile

different community activities aimed at educating youngsters can ensure the long-term effectiveness. Two impressive programs ('Line to work' and 'Purchase of Garbage') were implemented in Curitiba, besides some discarded factories have been reconstructed into cultural facilities, all of which maintain the link between community and government, also enhancing the social responsibility and belongingness (Rabinovitch,1992:67-68). In addition, 'Vauban' community in Germany is famous for its 'forum' (similar to an association) which integrates the efforts of government, city council, developers and residents. This pattern has made great contributions to organizing activities, educating residents and diffusing low-carbon information (Huang and Dai, 2011:42-45).

2.3 Briefsummary of the literature

In terms of the research on low-carbon community participation, the perspectives concentrate on public administration, policy-making and local democracy. However, it lacks the effective integration with the phenomenon of low-carbon city or community, such as residents' cognition, transformed lifestyle and innovative community systems. Among the research related to the topics above, the dominant role of governmental planning is mostly discussed while the importance of other parties including residents' committee and self-involvement is somewhat neglected, which also reflects the current situation of city construction and state-society correlation in contemporary China. Moreover, regarding discussions on influence factors and mechanisms, some factors seemed redundant with community participation. It is argued that related factors and mechanisms could be reconsidered and re-adjusted in order to obtain better results. In addition, how new media exerts the participation remains vague with researchers. The control, infiltration and guidance on Internet public opinion by state can sometimes impair the effectiveness of virtual participation, yet such phenomenon exactly reflects the complex relationship between state and society. Therefore, we aim to conduct my research in these deficient areas and expect to achieve some modifications.

3. Research methods and sampling criteria

This research relates to disciplines of urban sociology and environmental

governance. The authors aim to identify urban residents' cognition of low-carbon issues, explore the influence factors behind their low-carbon behavior, and eventually evaluate such current situation. According to this logic, quantitative methods will be primarily adopted especially questionnaire survey, apart from which participatory observation as well as theoretical rethink will also be applied for analysis. The questionnaire survey had been conducted in *Chengyang District*—an urban-sustainability model zone of Qingdao city, in the summer of year 2012. The questions in the questionnaire consist of four progressive and integrated sections: (1) Basic cognition of community dwellers about 'low-carbon' concepts, such as knowledge about important events of low-carbon history, sources of their low-carbon information; (2) Community residents' low-carbon lifestyle practices, such as commuting choices between private cars and public transport, domestic energy-saving behavior. (3) Low-carbon advocacy and policies by government or community (official and grassroots) organizations. For instance, "which are the important areas that respondents consider for governmental planning? (Pollutant control, public space exploitation, public transport, reducing private cars or rewarding low-carbon behaviors, etc)" (4) The cooperation as well as conflicts amongst local government, non-governmental organizations and residents when referring to the formulation of a low-carbon policy, e.g. "How is the process of decision-making in your community? (Predominant power, democratic degree, opinion leaders, information transparency, etc) "

Sampling method: 1200 copies of semi-open-ended questionnaires were sent and 1141 retrieved, with a valid percentage of 95.1%. The selection was in the light of "multi-stage sampling" principle, that is to say, at first stage four urban residents' committees, each one is in charge of 8-10 residential communities more or less) were selected from all nine committees of Chengyang Sub-district (which is also belonging to Chengyang District) by means of random sampling; next step is to adopt 'systemic sampling' method so that 200 households of residents were chosen in each committee, with a total amount of 800. In addition, in order to know about more cases apart from the residential areas above, "snowball sampling" was utilized to find those long-term dwellers in other communities belonging to Chengyang Sub-district.

4. Influence factors of urban community residents on low-carbon behavior

Refrained from the length of this article, statistical outcomes regarding descriptive analysis have to be consumedly simplified. By means of SPSS19.0 software, the current situation of urban residents' low-carbon participation can be sketched as follows: (1) Residents are generally paying attention to low-carbon issues, such as "global warming", "carbon emissions", and well-known climate-change conferences. (2) They are familiar with basic areas related to low-carbon city construction, including energy conservation, GHG reduction, public-transport renovation, urban afforestation, alternative fuels, and daily-life environmental protection. (3) Low-carbon consciousness has been embedded in everyday life, which reflects on the practices of domestic resources conservation and utilization of water/electricity-saving appliances. (4) Initiative and enthusiasm of low-carbon activities are still insufficient with community-level participation, compared with the relatively energetic domestic behavior. (5) Governmental dominant role in planning and policy-making is still perceived by respondents as the most responsible subject in terms of low-carbonized transition. According to statistics within "public space" section of the questionnaire, the majority claim to be satisfied with the development of green space/belt, leisure parks, community fitness facilities, etc; efforts to enhance urban forest acreage; policies to reclaim obsolete factories and wasteland which have been transformed into affordable shelters for urban vulnerable group. However, despite of the effectiveness gained from such planning, some of the policies are also blamed for its inefficiency, one-dimensional tendency and somewhat formalism which can be seen from few recreational activities in those grand and wide-vision citizensquares. (6) The function and impact of community organizations especially residents' committee which is originally perceived as a main force to facilitate well-being of civil society and local democracy in urban China are refrained temporarily, with sporadic efforts for citizens to enhance their discourse power. Therefore, in the light of such phenomenon, the researchers are dedicated to exploring influence factors of residents' low-carbon participatory behavior. By means of logistic regression of SPSS19.0 software, such factors consisting of congenial and self-induced ones are expected to be identified and assumed that different types and degree

arising from these independent variables would exert an influence on residents' low-carbon involvement accordingly.

4.1 Analysis on congenital factors

Congenital factors relate to natural gifts and rights of a person, which are exerted by one's position and circumstance in a certain social system. "Congenital" puts emphasis on the intrinsic difference within individuals, namely physiological factors determined by consanguinity and heredity, on the basis of which "social role" is initially formed. There are many forms of empirical research studying on the impact arising from such factors. Scores of sociologists reckon that gender difference does exert an influence on community participation to some extent, positively or negatively though not yet achieving a general consensus (Zhu, 2009: 31-32; Chen, 2004: 36-41), among which Lori Hunter (1992: 677-694) once conducted a well-designed and cross-national quantitative analysis discovering that female residents are more inclined to behave environmentally than their male counterparts. Given its out-dated data collection such as cohort features particularly varying environmental values, female's occupational status over male, and social context with upsurging low-carbon propaganda, it is necessary to examine whether such feminine tendency of environmentalism still exists. Regarding 'age' factor which was much less focused on its connection to environmental actions, it is deemed both in theory and common sense that the elder group who remains higher community identification and belongingness is more likely resorting to community residents' committee for their living demands, which might act as a momentum for a bigger willingness to community-oriented activities (Li, Li, and Gao, 2011: 117).

4.1.1 Hypotheses of congenital factors

Hypothesis 1: Residents' congenital factors exert an obvious influence on their community participatory behavior. Following:

Hypothesis 1a: After controlling other potential variables, 'gender' factor exerts an obvious influence on community participation. Specifically, female residents possess a stronger low-carbon consciousness than male, same as female's participatory degree.

Hypothesis 1b: After controlling other potential variables, 'age' factor exerts an

obvious positive influence on community participation. Specifically, elderly residents have more enthusiasm in low-carbon activities than any other age group.

4.1.2 Results of logistic regression

According to previous delimitation of “community residents’ low-carbon participation”, it can be classified as three levels: low-carbon cognition, individual low-carbon behavior, and community-level low-carbon behavior. In terms of data analysis, independent variables are gender and age, and dependent variables are operationalized as: degree of global-warming attention, whether to use public transport for commuting, and whether to disseminate low-carbon/environmental-protection knowledge to other community members.

(1) ‘Gender’ impact on community participation

The analyzing method of binary logistic regression will be adopted, in order to ‘examine separate influence of independent variables under the condition of statistical controlling’ (Guo, 2012). Table4-1 indicates basic statistical information of congenital factors and points out the reference group of ‘dummy variables’. Regarding the impact of

Table4-1 Means (M), standard deviation (SD) of variables and reference group (RG) of dummy variables

Independent variables	M	SD	Dependent variables	M	SD
Gender (RG=“female”)			Global warming attention (RG=“indifferent”)	0.731	0.444
Male	0.525	0.500			
Age (RG=“juvenile”)			Low-carbon commuting (RG=“no”)	0.907	0.291
Youth	0.729	0.445	Low-carbon dissemination (RG=“no”)	0.472	0.499
Middle age	0.162	0.369	Gaining low-carbon information from community (RG=“no”)	0.169	0.375
Elderly	0.037	0.188			

gender which remains a proportional condition (599:542), the significance-level of odds of gender and attention rate exceeds 0.05 (model I, table4-2), which means there is an unobvious influence arising from gender difference.

Secondly, in terms of whether to use public transport for commuting, the author categorizes subway, buses, light-rail, tram, bicycle and walking into “public transport” system. Other questionnaire options are synthesized as “non public transport”. As can be seen from model II, table 4-2, partial-regression coefficient of gender significantly exerting public transport choices is negative. Since reference groups are “female” and “non public transport” respectively, this result indicates that female residents prefer public transport for going out to private cars or taxis, compared with their male counterparts.

Finally, in order to investigate the situation of low-carbon knowledge dissemination, options of “do it actively” and “do it for acquaintances” are combined into “actively disseminating” with other options into “take no action”. From model III, table 4-2, we can find that gender difference has an obvious impact on community-level low-carbon knowledge dissemination, namely female residents have more passion and willingness to do so. This result is in accordance with both traditional ideas and previous literature.

(2) “Age” impact on community participation

Firstly, regarding whether to pay attention to global warming issues, regression results (model I, table4-2) show that the “attention odds” of the elderly is 2.59 times of that of juvenile group ($P < 0.05$), which makes logitP increase 0.95 unit averagely. Likewise, the attention rate of the middle-aged group is 1.79 times of juvenile’s and no obvious influence is found within the youth group. Thus, age difference has an influence on attention rate of different population to a certain extent, presenting a step distribution where willingness of the elderly group is the strongest.

Secondly, when it comes to priority selection of short-distance travelling, results in model II, table 4-2 display that age factor does not bring about difference in selecting transportation means. However, the author argues that this outcome is not equal to the inference like “residents generally prefer public transport due to low-carbon consideration”. Because the juvenile are mainly commuting from campus to home and they cannot afford alternatives especially private vehicles. In addition, the elderly who

rarely go beyond the residential community are often refrained from their action radius, thus they take more inclination with walking.

Finally, in terms of community-level low-carbon involvement, another dependent variable is added into the model namely “whether to obtain low-carbon knowledge from your own residents’ committee” which is expected to measure the dependence of elderly people on community organizations. Data in model III and IV indicate insignificant effects of age difference, especially the fact that elderly people do not enjoy a close connection with community organizations and neither do they have a strong aspiration for propagating low-carbon information to others.

As for the age-factor assumption, despite the elderly group show a higher attention rate on global-warming issues, they do not possess stronger willingness in other forms of participation. The assumption can be perceived as “non-inspected”, which is probably

Table 4-2 Logistic-regression results on congenital factors exerting community low-carbon participation

Independent variables	Model I		Model II		Model III		Model IV	
	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)
<i>Gender</i>								
Male	-0.19 1	0.826	-0.49 0	0.612*	-0.31 8	0.728**	N	N
<i>Age</i>								
Youth	0.352	1.422	0.093	1.097	-0.35 6	0.700	-0.44 6	0.640
Middle-age	0.607	1.834*	-0.16 4	0.848	0.184	1.202	0.320	1.378
Elderly	1.026	2.789*	-0.39 9	0.671	-0.19 1	0.826	-0.23 9	0.787
Constant	0.714	2.042**	2.536	12.635**	0.093	1.097	-1.34 1	0.262**
Adjusted R ²	0.011		0.015		0.031		0.081	

Note: Model I—Influence factors on global-warming attention rate; Model II—Influence factors on whether to select “low-carbon” transportation; Model III—Influence factors on whether to actively participate in low-carbon propagation; Model IV—Influence factors on whether to obtain low-carbon information from community organizations; In the table, *, P<0.05; **, P<0.01.

affected by “interest-oriented” lifestyle and “free-riding” mentality. Furthermore, the role of community organizations is refrained temporarily so that elderly people are intended to establish a homogeneity cohort that might impede their interpersonal communication and emotional expression.

4.2 Analysis on self-induced factors

Self-induced factors relate to ones that are controllable and changeable when people strive for social status and evaluation. Ralph Linton, a social anthropologist, initially adopted this terminology to substitute for C.H Cooley’s “competitiveness”. This type of factor focuses on personal performance and self-achievement, also points out the importance of education, cultivation as well as vocation. The emphasis on self-induced factors is a critical feature of modern society.

4.2.1 Hypotheses of self-induced factors

Hypothesis 2: Residents’ self-induced factors exert an obvious influence on their community participatory behavior. Following:

Hypothesis 2a: After controlling other potential variables, “educational status” factor exerts an obvious positive influence on community participation.

Hypothesis 2b: After controlling other potential variables, “occupational type” factor exerts an obvious positive influence on community participation. Specifically, residents belonging to higher social strata have more enthusiasm in low-carbon activities than any other strata.

Hypothesis 2c: After controlling other potential variables, “quality of community environment” factor exerts an obvious positive influence on community participation.

Hypothesis 2d: After controlling other potential variables, “family consumption” factor exerts an obvious negative influence on community participation.

4.2.2 Results of logistic regression

As can be seen from regression analysis in table4-4, in terms of global-warming attention, self-induced factors do not exert an obvious influence apart from an indifferent attitude with working-class residents.

Table 4-3 Means (M), standard deviation (SD) of variables and reference group (RG) of dummy variables

Independent variables	M	SD	Independent variables	M	SD
Educational status (RG="middle school and below")			Management level	0.063	0.243
High school and junior college	0.416	0.493	Satisfaction degree on community environment (RG="unsatisfied")		
Bachelor and above	0.461	0.499	Normal	0.350	0.477
Occupational type (RG="unemployed")			Satisfied	0.458	0.498
Student	0.269	0.444	Private car ownership (RG="no")	0.335	0.472
Working class	0.374	0.484	Water & energy saving (RG="no")	0.699	0.459
Middle level	0.197	0.398			

Regarding domestic low-carbon behavior, two dependent variables are included to promote the validity of analysis. Self-induced factors show relatively obvious effects on dependent variables, but the conditions and degree of such effects vary from different issues and circumstances. (1) "Educational status" factor exerts an obvious positive influence, which might relate to more knowledge and resources beneficial to environmental protection possessed by well-educated population who also remain a dominant position accessible to public-policy trends. (2) "Occupational type" factor shows an obvious impact on low-carbon transportation but makes no difference in domestic conservation habits. (3) Illuminated from urban sociological theories, geographical features such as residential location, density, living conditions within and without will affect individual or collective behaviour. Researchers often select the category of community to partially embody the urban space in order to explore its tie to collective movements (Gottdienerand Hutchison, 1994; Millerand Nicholls, 2013:459). The factor of "Satisfaction degree on community environment" which operationalizes one of the dimensions of such community category, meanwhile approximately reflects the

low-carbon efforts within different residential communities, which might be the causation why it exerts an obvious positive influence on individual participation.(4) Ownership of private cars, as an important indicator to measure household consumption level, presents a quite obvious negative impact on low-carbon engagement. It is argued that current social ethos of “consumerism” contributes to such behavioral pattern. (5) On the community-level low-carbon activities, similar to the section of current situation analysis, residents’ participation is oriented with self-interests. In other words, they possess strong consciousness in personal or domestic low-carbon behavior while they lack passion in issues such as diffusing knowledge to others or taking parting in public-spirited activities.

Table 4-4 Logistic-regression results on self-induced factors exerting community low-carbon participation

Independent variables	Model I		Model II		Model III		Model IV	
	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)
<i>Educational status</i>								
High school and junior college	0.020	1.020	0.176	1.192	0.830	2.294**	-0.066	0.936
Bachelor and above	-0.105	0.900	-0.067	0.935	0.822	2.276**	0.364	1.439!
<i>Occupational type</i>								
Student	-0.247	0.781	1.094	2.987*	0.006	1.006	-0.169	0.844
Working class	-0.525	0.591*	0.049	1.050	0.104	1.110	-0.172	0.842
Middle level	-0.439	0.644	0.267	1.316*	0.043	1.043	0.120	1.128
Management level	-0.565	0.568	0.116	1.124	0.084	1.087	1.153	3.168**
<i>Satisfaction degree on community environment</i>								
Normal	0.002	1.002	0.466	1.594!	-0.024	0.976	-0.180	0.835
Satisfied	-0.216	0.806	0.791	2.207**	0.542	1.719**	0.365	1.441*
<i>Private car ownership: Yes</i>								
Constant	1.464	4.325**	2.288	9.859**	0.480	1.616!	-0.229	0.796
Adjusted R ²	0.051		0.057		0.074		0.091	

5. Conclusion and discussion

The writers aim to investigate the current situation of community participation in Qingdao by: examining its low-carbon demonstration district—Chengyang, exploring the factors and mechanisms related to this participation, and identifying its successful experiences as well as the weaknesses. Through in-depth empirical research especially the questionnaire survey, this paper is expected to provide evaluative insights about the broader impacts of low-carbon urban policies and lifestyles in Chinese cities. The research puts emphasis on issues including low-carbon cognition, consciousness and behavior, governmental role, function of community organizations as well as influence factors comprising congenital and self-induced ones. Through current-situation evaluation, hypothesis examining and theoretical analysis, the experience arising from related conclusions listed as follows demonstrates a number of principles which might be considered applicable elsewhere. Inspired by urban sociological theories, it is argued that a pattern of urban growth should be established in conjunction with a ‘conscious’ decision to promote an integration of different elements of urban development, that is to say, conscious technical, political and economic decisions should be made in response to existing trends. A city, especially a metropolis like Qingdao which is being embedded in current spiralling Mainland urbanized process, should realize and rethink where it is evolving, how and why.

(1) According to successful experience of world ecological cities, residents’ community participation plays a significant role, which is also a proceeding of empowerment and self-government. Emphasizing the essential idea of ‘power bestowed to the public’, community participation in urban governance is itself a course of gradual acquirement of such empowerment. However, Mainland China still remains at the initial stage of low-carbon city construction, with imperfection of theories, technology, organizations and institutions. Thus, refrained from social reality, community residents mainly focus on low-carbon issues like domestic energy-saving and information propaganda, which is expected to fill the higher-phase gap in institutional design or NGO coordination. It is worth mentioning that, the latter demands are also important aspects

of urban management innovation. In other words, low-carbon community participation is not merely related to environmental conservation, but linked to more extensive social affairs including urban sustainability, local self-government, etc.

(2) Initiative and enthusiasm of low-carbon activities are still insufficient with community-level participation, compared with the relatively energetic domestic behavior. It is argued that such participatory pattern is oriented with self-interests, which can be explained by “public good” dilemma and “free-riding” mentality. Theoretically, urban lifestyle itself presents a distinct ‘rational’ feature lacking of emotional devotion, besides the distrust among neighbours increased to a certain extent due to the disengaged social capital which resulted from the collapse of ‘unit’ system in Mainland cities in 1990s. Under the aegis of this unique system, a citizen whose social welfare (especially residential housing policies under which he was no more than a ‘tenant’ in a unit-property apartment), medical treatment, offspring education and interpersonal relationship were undertaken even bound by his unit (similar to nowadays ‘enterprise’, but most enterprises were state-owned during that period). Furthermore, community environment as quasi-“public good” featuring limited exclusiveness as well as competitiveness, is often neglected by its residents who are at most concerned with their individual benefits acquiring from this ‘public good’ (such as outdoor recreation) rather than protecting it. In addition, low-carbon community participation usually fetches out the tendency of “free-riding” which virtually remains in all sorts of collective actions. In order to maximize benefits, “noncooperation” is actually determined by community members whose mutual distrust could be exacerbated and individual interests would be impaired in the long run, notwithstanding they might reap where one has not sown regarding natural environmental maintenance.

(3) Governmental planning still remains a predominant position in low-carbon affairs. On the contrary, the function and impact of residents’ committee and other community organizations are refrained temporarily, with sporadic efforts for citizens to contest for position, influence, power and discourse. Mainland citizens have been trusting even relying on national public authorities for decades, while the traditional age of “almighty government” has receded due to the weakening foundation of official authoritativeness. Thus, it is imperative that the central government should adjust

its management model as well as delegate more power to the local. Under such a circumstance of functional changeover, the working efficiency and public service of government would be enhanced, which is beneficial to community residents who are still less prepared for the situation. Meanwhile, non-governmental organizations are still struggling for their influence and discourse on community-level low-carbon affairs (Hong, 2007:230-35). As showcased in Curitiba case, such organizations are conducive to promoting residents' awareness of environmental protection, developing community-owned resources and establishing relevant systems, which is often deemed as the organizational foundation of environmental governance. The system of regulation and management of community organizations in Mainland China is gradually improving, but "the residents' committee" which has a strong association with local CPC branches presents an obvious feature of "state in society". With regard to several community NGOs under the aegis of *Chengyang Sub-district Office*, their growth, independence as well as activities are somewhat restrictive. Apart from roles of government and NGO, opinion leaders and elites who possess advantages of education and social capital have expressed urgent willingness for low-carbon propaganda and mobilization, nevertheless, they lack formal channels of participating in public affairs whilst their utterance impact is also severely suppressed. Overall, the deficiency of a democratic institutional provision is the main restricting factor for residents to participating in community public affairs, due to which situation the innovation of city management pattern continues to face arduous tasks.

(4) Assisted by the method of Logistic regression, different effect levels of influence factors can be found in diverse circumstances. Consequently, dwellers' low-carbon behavior can be classified as two categories: passive involvement and rational involvement. As presented in statistical results, respondents like students, ordinary working class and the elderly are more inclined to behave eco-friendly. Such causality is arising not only from their better low-carbon consciousness but also the deliberation of saving daily economic expenses, which can be perceived as a passive type of community participatory behavior. On the other hand, residents who belong to the stratum of management level and hold higher educational degree are more likely to compete for a better residential environment and their own discourse power, by

participating in community-level low-carbon activities including propaganda, advices, inquiry, petition and even anti-pollution campaigns. Superior in social capital, fresh ideas and technical resources, they can sometimes even exert an actual impact on related policy-making and institutional modification, which can be identified as some active motive features related to “instrumental reason”.

The authors would like to point out that the positive even ardent responses of urban elites to “low-carbon” state policies seem grudging and suspicious in their real intention, yet it still can be perceived as a freedom and trueness of expression combined with current changing and subtle social context. Gradually disenchanted from the previous governing pattern of communism ideology, irrespective of CPC-self-boasted “characteristic socialism” or western-labeled “state capitalism”, it cannot be denied that the authoritarian legacy of discourse suppression still remains somewhat alive nowadays. However, observing the features and aftermath of Mainland China’s social governance efforts and civil disobedience achievements within the decade, urban residents still keep considerably silent on politically sensitive issues, while they have been empowered to a large extent to represent themselves regarding environmental problems. From 2008 to 2014, myriad large-scale protests and NIMBYism confrontations erupted in Mainland China drastically contesting for a stride towards ecological equity and accountability to pollution events (Shapiro, 2012). As a matter of fact, CPC has embarked on pouring great efforts into advocating public awareness of environmental conservation whilst vigorously propping up the institutionalization of ENGOs. It is argued for the latent causality that CPC is now yearning for establishing a brand-new ruling legitimacy embedded within a contemporary era of spiraling social transformation. Environmental movement, even with its most radical forms, stands out as a solution-oriented collective action whose aim aligns with the means for exclusively addressing a certain issue, also possessing a relatively weak connection to political liberalization or partisan restructuring (Lang and Xu, 2013). Moreover, the mobilization of those deprived from industrial pollution or emission exposure is still perceived as one of the most traditional tactics declaring CPC’s intrinsic belongingness to ordinary people especially the working class, which is occasionally but wittily harnessed to condemn the side effects arising from market-oriented capitalism with western origin. In addition, a more enlightened and tolerant

image of CPC would be rebranded in terms of societal and international arena, if urban residents were empowered more discourse and influence in petition, protest and even confrontation. Hence, the freedom of speech has been somewhat guaranteed, though solely in eco-friendly activities, which is also accordance with several social transitions emerging in Mainland China, such as the eclipse of communism propaganda, mounting consciousness of environmentalism as well as the shifting national strategy towards low-carbonized urban development.

(5) In addition, to a certain extent, the notion of “consumerism” especially the prevailing “automobile culture” has restricted the promotion of “low-carbon lifestyle”. There has been a functional transition with private cars from a highly manoeuvrable vehicle to a symbol of social identity and status, which can partly explain the statistical causation that private-car owners who have been accustomed to “more consuming, more extravagant” lifeway are relatively unenthusiastic to participate in low-carbon activities. However, when the soaring prosperity of automobile industry outpaces the carrying capacity of natural environment, the unaffordable prices arising from “high-carbon” life would bring about a tardy repentance to the humanity, the rather that it still remains fresh in our memory with those bitter but profound lessons drawn from the unsustainable pattern of economic development during the early stage of industrialization in developed countries.

Consequently, countermeasures or suggestions are proposed to prompt the process of community participation, in terms of cultivating low-carbon culture, transforming government’s function, improving interior motivation mechanisms, supporting the growth of civil society, and bearing of the side effects of consumerism. In fact, these ideas are also in accordance with the demands of urban management innovation in Mainland China. Embedded in a social context of both “almighty government” ineffectiveness and market-orientation deficiency, in order to accomplish the ambitious human-scale prospect labeled as “better city, better life” (slogan of Shanghai Expo 2010), urban residents who live as the crucial stakeholder within urban public space have become a vigorous impetus to the well-being of a low-carbon city endeavour. Likewise, when a city has obtained a fruitful success with respect to sustainability, livability, ecological equilibrium as well as

community participation, it would be also in turn propitious to enhancing residents' living standards, public awareness, and social responsibility. It is argued that such development pattern highlighting the active collective action which is integrated with mutual-trust, reciprocity and interaction can be generalized as an evaluative experience exploring the broader impacts of low-carbon urban polices and lifestyle in Mainland Chinese cities.

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Analysis on Current Situation and Influence Factors of Community Residents' Participation during the Process of Low-Carbon City Construction—On the Basis of An Empirical Investigation in Chengyang District, Qingdao, Mainland China

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Abstract

Mainland China's urbanization process is being retarded by environmental issues. Embedded in such social context, the development pattern of 'low-carbon city' highlighting 'sustainability' has been in the limelight of public opinion. Particularly, the ultimate orientation of such development should be aimed at the low-carbonized transformation in each urban community, which maintains the long-term vitality of a low-carbon city. The writers aim to empirically investigate the current situation of community participation in Qingdao by: examining its demonstration district—Chengyang, exploring factors and mechanisms related to this participation, and identifying its successful experiences as well as weaknesses.

Assisted by the method of logistic regression, different effect levels of factors can be found in diverse circumstances. On this basis, it is argued that Chinese urban residents generally have strong low-carbon consciousness, whereas their participation patterns which can be classified as two types (passive and rational) stagnate at a relatively low level. In addition, governmental planning still remains a predominant

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position in low-carbon affairs. The function and impact of civil society are refrained temporarily, with sporadic efforts for citizens to enhance their discourse power. Finally, suggestions which accord with the demands of China's urban management innovation are proposed to prompt the process of community participation. Overall, this article is expected to provide evaluative insights about the broader impacts of low-carbon urban policies and lifestyles in Chinese cities.

Keywords: low-carbon city, community residents' participation, influence factors, governmental planning, civil society.