

# County Development and Sustainability in China A Systematic Scoping of the Literature

Yang Yinghong <sup>a</sup>, Li Yan <sup>a</sup>, Siu Man (Carrie) Lui <sup>b</sup>, Irina Kinchin <sup>c</sup>,  
Marion Heyeres <sup>b</sup>, Komla Tsey <sup>d</sup>

<sup>a</sup> Department of International Trade, College of Economics and Management,  
Shenyang University of Chemical Technology, Shenyang, China.

<sup>b</sup> The Cairns Institute, James Cook University, Cairns, QLD, Australia

<sup>c</sup> Central Queensland University, Cairns, QLD, Australia and The Cairns Institute,  
James Cook University, Cairns, QLD, Australia.

<sup>d</sup> The Cairns Institute & College of Arts Society and Education, James Cook University, Cairns, QLD, Australia,

<sup>d</sup> Corresponding author: [komla.tsey@jcu.edu.au](mailto:komla.tsey@jcu.edu.au), Tel: +61 7 42321257; Fax: +61 7 40574511

OIDA International Journal of Sustainable Development, Ontario International Development Agency, Canada  
ISSN 1923-6654 (print) ISSN 1923-6662 (online) [www.oidaijsd.com](http://www.oidaijsd.com)  
Also available at <http://www.ssm.com/link/OIDA-Intl-Journal-Sustainable-Dev.html>

**Abstract:** Despite the importance of research and innovation in facilitating sustainable county development in China, little evidence is available concerning the output and characteristics of that research. This scoping review assesses key features or characteristics of the research output, the extent to which researchers engage with concepts of sustainability and the potential impact of the research. Publications were identified and classified using a process consistent with Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA). The R programming packages *igraph* and *wordcloud* respectively were used to analyse and graphically depict the strength of authorship networks and keyword frequency. Findings revealed that this field of research is an evolving one with a widely-dispersed network of researchers increasingly using new keywords. The implications of the review findings for improving the value and impact of sustainable county development research are explored.

**Keywords:** county development; sustainability; research output; authorships networks; keywords; usage and impact

## Background

Following the United Nations Conference on Environment and Development in 1992, the Chinese government published 'China's Agenda 21' as a road map for guiding a sustainable development path for the country ("China's Agenda 21: White Paper on China's Population, Environment, and Development in the 21st Century," 1994). Included in the Agenda 21 priority actions were the promotion of awareness of environmental protection and improved use of resources within ethical and moral frameworks, cleaner energy, waste reduction and a balanced ecosystem, with consideration of the impacts on women and vulnerable groups. Agenda 21 also committed policy makers to monitoring and evaluating environmental and development impacts.

Agenda 21 (1994) marked the beginning of the sustainable development process in China. A preliminary search of the literature identified a significant number of publications focusing on this process since the turn of the century. Topics including urban design, renewable energies, environmental protection, housing, economic growth, agriculture, climate change, tourism, information technology, and education were frequently covered. Most publications were project reviews, descriptions or evaluations, with only one paper (Tan, Xu, & Zhang, 2016) identified as a literature review. This review followed a systematic approach to the literature search but did not adhere to the Cochrane protocol (Higgins & Green, 2011) and, specifically, did not appraise the quality of the studies included. Our preliminary literature search suggests that it is appropriate to conduct a scoping review to identify the total output and the characteristics of research that has so far been conducted on sustainable development in China.

A scoping review is a systematic literature review intended to outline the essential features of existing knowledge in a particular field of research. It should identify key concepts and sources of evidence as well as highlighting strengths or omissions in the research (Pham et al., 2014). Where there is a large and diverse volume of complex, disconnected and interdisciplinary knowledge, a systematic literature review is an effective tool for assessing the existing state of knowledge and suggesting directions for further research (Tranfield, Denyer, & Smart, 2003).

### **County development and sustainability in China**

Since 2002, the Communist Party of China has made efforts to boost the county economy by prioritising development of the agricultural processing industry. At the same time there has been rapid industrial and agricultural growth which threatens the sustainability of China's environment, human health and wellbeing. Levels of air pollution and overcrowding are so extreme that there is now widespread risk of respiratory and other severe health problems (Li & Hu, 2012).

'Sustainability' refers to the county's ability and capacity to support or maintain itself, taking into account the complex interplay of environmental, social and economic factors and the finiteness of natural resources (Agenda 21, 1994). It is based on the idea that the survival and wellbeing of the earth and its inhabitants depend directly or indirectly on the natural environment. Sustainable development creates the conditions under which current and future generations can coexist with nature in productive harmony.

The term 'county' refers to the basic administrative unit of China's national economic development. There are currently 2,352 county units in China, representing more than 70% of the population and 90% of the country's land area (Li & Hu, 2012). Despite the importance of research and innovation in facilitating sustainable county development (National Development and Reform Commission, 2007), little evidence is available concerning the output and characteristics of county development research in China. This scoping review assesses key features or characteristics of the research output on county development, the extent to which researchers are engaging with concepts of sustainability, and the potential impact of the research measured by the frequency of citations and downloads of the papers identified. The questions guiding the review were: What is the total publication output on sustainable county development in China? Which authors and institutions are publishing on county development and sustainability? How are the authors engaging with concepts of sustainability? What is the quality of the journals in which the papers are published? What proportion of the papers are supported by research funding? How frequently are the papers cited and/or down loaded?

### **Methods**

Publications were identified and classified using a process consistent with PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) (Moher et al. 2009). An a priori protocol for this review was circulated among the study co-authors until consensus was reached about the research questions and methods.

#### ***Inclusion/Exclusion criteria***

Studies were included in this review if they were published between 1996 and 2014, written in the Chinese language, focused on county development and addressed issues relating to sustainability. Studies outside this date range or not focusing on the issues of sustainability were excluded from the analysis.

#### ***Search Strategy***

China's Academic Journals database (China National Knowledge Infrastructure – CNKI <http://oversea.cnki.net/kns55/default.aspx>), the world's largest continuously updated Chinese periodical full-text electronic database, was used as the primary source of data. The CNKI is considered to be the largest and most accurate source of research in the field of county development and sustainability. As of 6<sup>th</sup> July 2016 the CNKI held more than 8,093 domestic academic journals, more than 44.4 million full-text articles (China Academic Journal Network Publishing Database, 2016) and 96% of the highest quality journals (Qi, 2013). The search was done on 6<sup>th</sup> July 2016 using the term county, economic development (县域经济发展) in either the title, abstract or keywords. The papers with sustainability were then identified by including sustainability (可持续县域经济发展) in the search term and repeating the search.

### ***Screening of studies for inclusion***

Studies were classified by the first author and year, the number of articles published, journal category, institution distribution, funded status and frequency of citations and downloads, and across a range of other quantitative and qualitative characteristics. During the screening and classification process over 90% agreement between two primary reviewers (LY and LYH) was achieved. When disagreements occurred, a third reviewer (KT), who has extensive expertise in systematic literature searches review, was consulted.

### ***Co-authorship networks***

Co-authorship networks are a type of social networks used to determine the structure of scientific research collaborations, assuming there are social bonds among co-authors. Scientific collaboration has many benefits for the development of a scientific research field. Co-authorship network of literatures from a specific research field helps us to understand the extent of collaboration of the research field (Bordons, Aparicio, González-Albo, & Díaz-Faes, 2015). Co-authorship network analysis has also been used to inform the strategic planning, allocating research funding, and targeting capacity building in neglected research area (Morel, Serruya, Penna, & Guimarães, 2009).

In this study, we extracted co-authorship data from CNKI database for the selected papers. Then, an undirected, binary graph was constructed and visualised to represent the co-authorship network using the R programming package igraph (<http://igraph.org/r/>). If any two authors co-authored a paper, an edge was created between the nodes representing each author, and the node representing the paper. The number of connected clusters in the co-authorship network and component sizes are used to reflect the extent of collaboration in the research field. A component of a network is a set of nodes in the network in which all nodes are directly or indirectly connected. The number of authors connected by the largest connected component in the co-authorship network may contain 20% to 65% of all authors in the specific research field (Bordons et al., 2015).

### ***Keywords analysis***

Many databases include keywords to facilitate indexing and searching. Keywords and keyword frequency analysis help to determine the keywords commonly used in a discipline and hence can reveal related thematic structure of research foci in a research field. In this study, we extracted keywords data from CNKI database for the selected papers. A graphical representation of keyword frequency is presented using a word cloud created with R programming package wordcloud (<https://cran.r-project.org/package=wordcloud>). The font size of each keyword in the wordcloud is proportional to its frequency in the selected paper. To identify the popular topics covered by the keywords during the specified time periods, keywords that appeared at least twice in any one of four time periods were analysed. Research hotspots based on high-frequency keywords over different time periods were then identified.

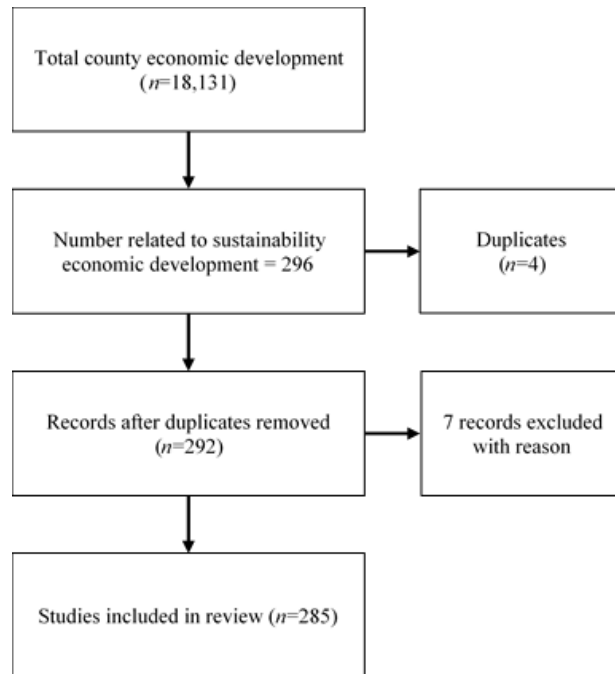
### ***Statistical analysis***

Statistical analysis was performed in SPSS version 22.0 (SPSS Inc., Chicago, IL) and iNZight (Version 2.5). Categorical variables were described using count and relative frequency; continuous variables were analysed using median and range. For funding analysis, the association between the dependent variable (Funding) and predictor factors (Table 4) was assessed in a bivariate model using the chi-square test ( $\chi^2$ ). The Phi coefficient ( $\phi$ ) was used to estimate the effect size of an association, with  $\phi$  greater than 0.80 considered very strong, between 0.60 and 0.80 strong, between 0.40 and 0.60 relatively strong, between 0.20 and 0.40 moderate, between 0.10 and 0.20 weak and less than 0.10 negligible (Rea & Parker, 2014).

The methodology of Antoniou, Antoniou, Georgakarakos, Sfyroeras, and Georgiadis (2015) was applied for citation and download analysis. A multiple linear regression model was repeated with logarithmic transformation of the dependent variable (the natural logarithm of the number of downloads) to assess for a logarithmic, rather than a linear relationship between the dependent and independent variables. Dummy variables were introduced to assess the effect of categorical variables with more than 2 categories. A 2-sided value of 0.05 was used to indicate statistical significance in the regression analysis and the chi-square test.

## **Results**

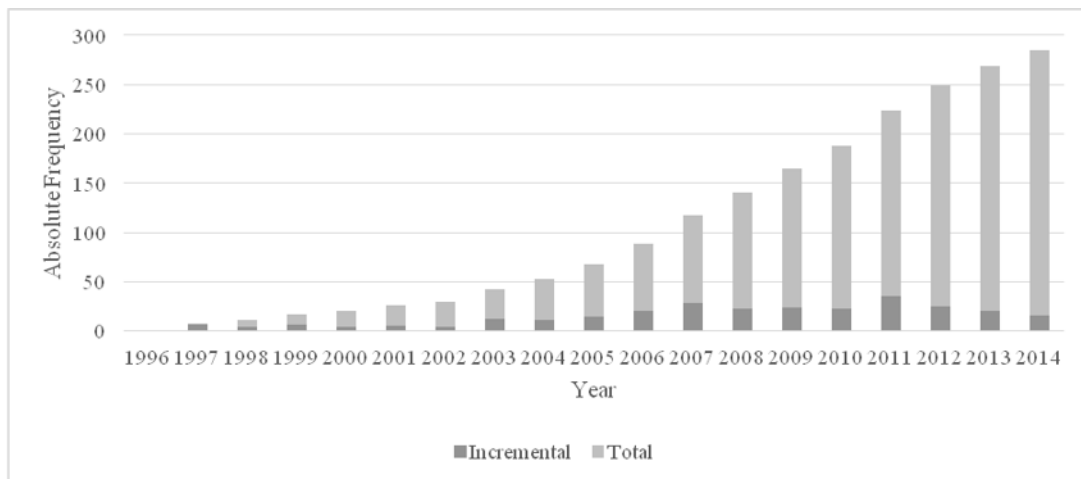
The database search yielded 18,131 papers, of which 296 were related to sustainability (Figure 1). After removing duplicates, titles, abstracts and keywords were screened by the two reviewers (LY and LYH). The round two screening process resulted in 285 publications (2% out of 18,131) that ultimately met the inclusion criteria and formed a representative sample for the analysis.



**Figure 1. Search strategy**

### ***Publications Growth Rate***

The overall number of publications varied over time following, in general, an upward-sloping trend (Figure 2). In particular, 2007 and 2011 were marked by notable annual research growth rates of 10.18% and 12.63%. The largest number of publications (13%,  $n=36$  of 285) was produced in 2011 alone. Overall, the number of Chinese-language publications on county development and sustainability increased significantly from 1996 ( $n=1$ ) to 2014 ( $n=285$ ). These 285 publications appeared in 220 different journals.



**Figure 2. Annual total and incremental change in the number of publications from 1996 to 2014**

We compare the growth rate of Chinese-language publications that have only county development in title or in abstract or in keywords to those that have both county development and sustainability concepts in title or in abstract or in keywords. As shown in Figure 2, for the period of 1996–2014, the county development and sustainability annual research growth rate achieved an average value of 5.54% with standard deviation equals to 3.454. These overall growth

trends are similar to the overall growth trends of research related to county development with average annual growth rate of 5.48% and standard deviation of 2.618.

**Table 1. Growth rates of country development versus county development and sustainability publications**

County Development and Sustainability Publications					County Economic Development Publications			
Year	# of papers	Cumulative # of papers	Cumulative % of papers	Annual growth rate in %	# of papers	Cumulative # of papers	Cumulative % of papers	Annual growth rate in %
1996	1	1	0.35%	-	279	279	1.36%	-
1997	6	7	2.46%	2.11%	290	569	2.77%	1.41%
1998	4	11	3.86%	1.40%	298	867	4.21%	1.45%
1999	6	17	5.96%	2.11%	434	1301	6.32%	2.11%
2000	4	21	7.37%	1.40%	499	1800	8.75%	2.42%
2001	5	26	9.12%	1.75%	440	2240	10.89%	2.14%
2002	4	30	10.53%	1.40%	549	2789	13.55%	2.67%
2003	12	42	14.74%	4.21%	1004	3793	18.43%	4.88%
2004	11	53	18.60%	3.86%	1389	5182	25.18%	6.75%
2005	15	68	23.86%	5.26%	1549	6731	32.71%	7.53%
2006	21	89	31.23%	7.37%	1619	8350	40.58%	7.87%
2007	29	118	41.40%	10.18%	1687	10037	48.78%	8.20%
2008	23	141	49.47%	8.07%	1594	11631	56.52%	7.75%
2009	24	165	57.89%	8.42%	1606	13237	64.33%	7.80%
2010	23	188	65.96%	8.07%	1585	14822	72.03%	7.70%
2011	36	224	78.60%	12.63%	1427	16249	78.96%	6.93%
2012	25	249	87.37%	8.77%	1458	17707	86.05%	7.09%
2013	20	269	94.39%	7.02%	1436	19143	93.03%	6.98%
2014	16	285	100.00%	5.61%	1435	20578	100.00%	6.97%

### Region of publications

Eastern areas of China produced 42% ( $n=120$  of 285) of the publications, followed by Midland China with 34% ( $n=97$  of 285) and Western China areas with 24% ( $n=68$  of 285) (Figure 3). Hunan (Midland China) and Hebei (Eastern China) contributed the greatest number of papers, 7% of the total output, with 21 and 20 papers respectively. Tianjin and Shanghai in Eastern China, Neimeng and Guangxi in Midland China, Chongqing and Ningxia in Western China had the lowest proportion of research publications in the county development and sustainability field over the time (1%,  $n=2$  of 285).

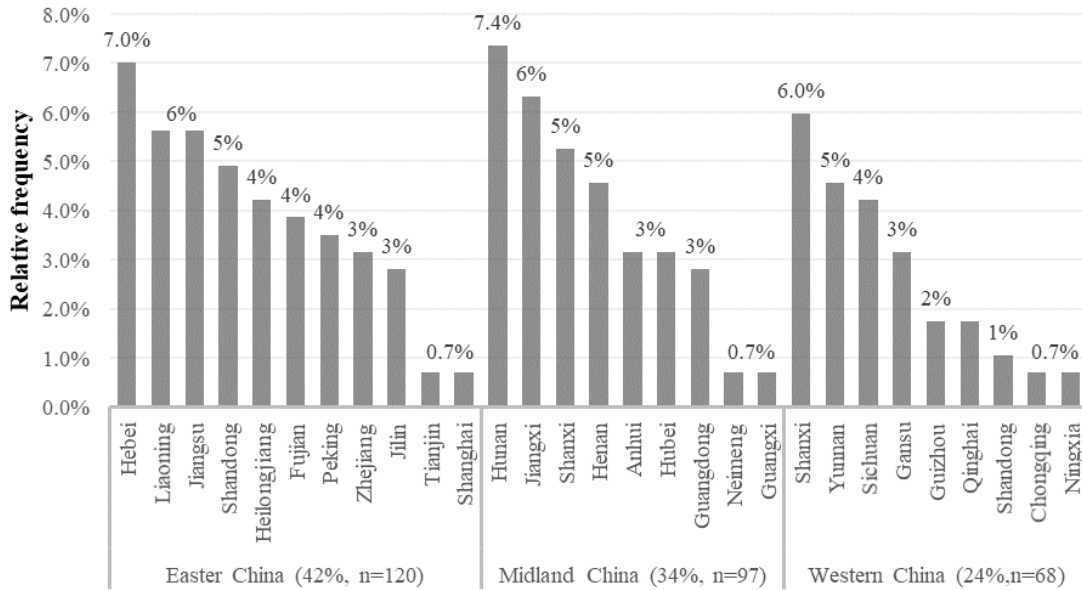


Figure 3. Publications statistics by regions and provinces

**Journal quality and funding**

Across all regions of China, authors from academia tend to publish their research in high quality journals (20%;  $n=58$  of 285) compared to non-academic colleagues (5%;  $n=14$  of 285) (Figure 4). In general, the majority of the research 75% ( $n=213$  of 285) was published in general quality journals and only 25% ( $n=72$  of 285) was published in high quality journals such as the Chinese Social Science Citation Index CSSCI (13%,  $n=38$  of 285) and PKU Beijing University (12%,  $n=34$  of 285).

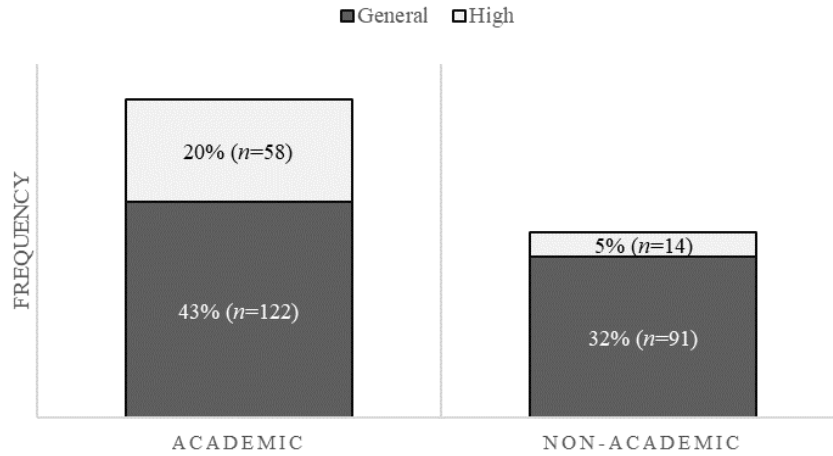


Figure 4. Distribution by academic affiliation and journal quality

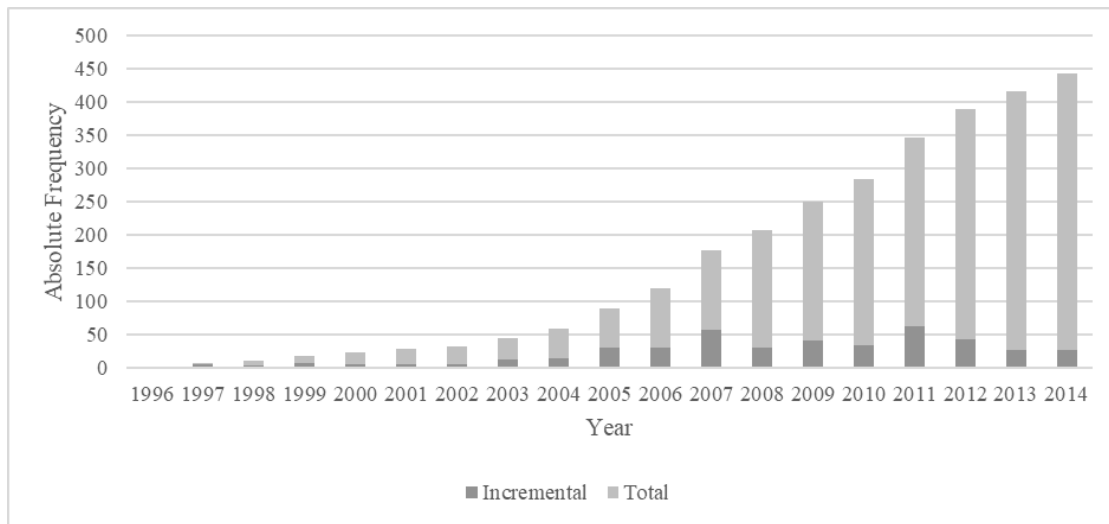
A large proportion of the publications in the field (91%,  $n=260$  of 285) did not report funding support and only 9% ( $n=25$  of 285) of the studies reporting some sort of funding. The National Social Science Foundation and the National Natural Science Foundation funded the highest number of studies (6 papers each) followed by local funds of the Hunan

province (5 papers) and the Hunan Provincial Social Science Foundation (3 papers). No other funding body supported more than one paper.

### *Authors & Affiliated Organisations*

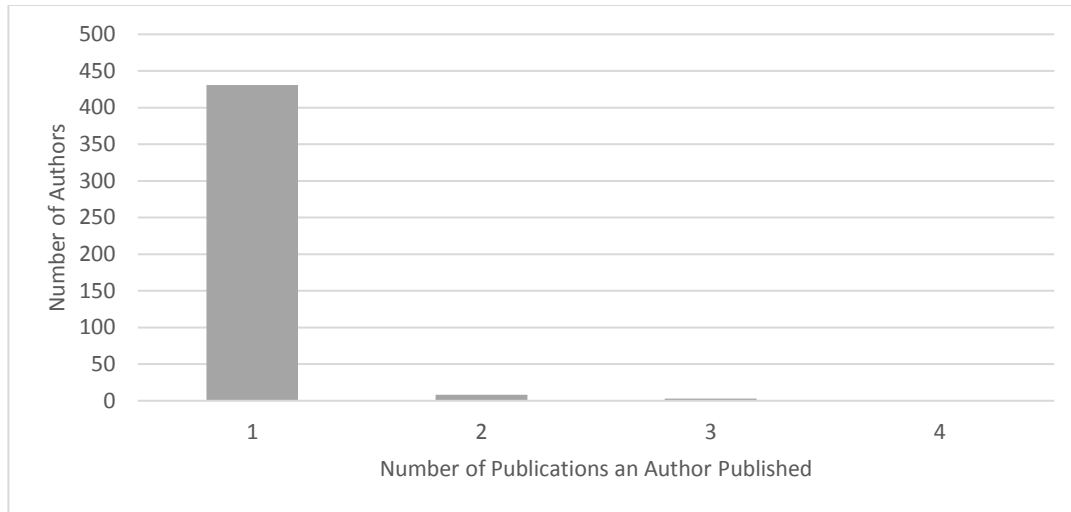
For all the 285 selected publications, there are 8 publications with no author identified. With the remaining 277 publications, there are 443 different authors identified. The minimum number of authors per publication is 1 and the maximum is 6. The mean and standard deviation for the number of authors per publication are 1.618 and 0.926. In total, there are 273 affiliated organisations involved in the selected publications. All organisations are from China, except one (University of Sydney) is from Australia.

The overall number of authors varied over time following, in general, an upward-sloping trend (Figure 5). In particular, in years 2007, 2009, and 2011 have notable annual author growth rates of 12.87%, 9.48%, and 14%. The largest number of authors (14%,  $n=62$  of 443) was added in 2011 alone. The number of authors involved in Chinese-language publications related to county development and sustainability reached an average annual research growth rate of 5.54% with standard deviation equals to 4.171 over the period covered by the review.



**Figure 5. Annual total and incremental change in the number of authors from 1996 to 2014**

Most of the authors (431, 97.29%) published once in the selected publications. There are only 12 authors who have appeared in more than 1 of the selected publications. There is one author involved in 4 publications, 3 authors with 3 publications, and 8 authors with 2 publications (see Figure 6). These 12 authors are affiliated to 8 different organisations, the details are shown in Table 2.



**Figure 6. Number of publications each author published in the period covered by the review**

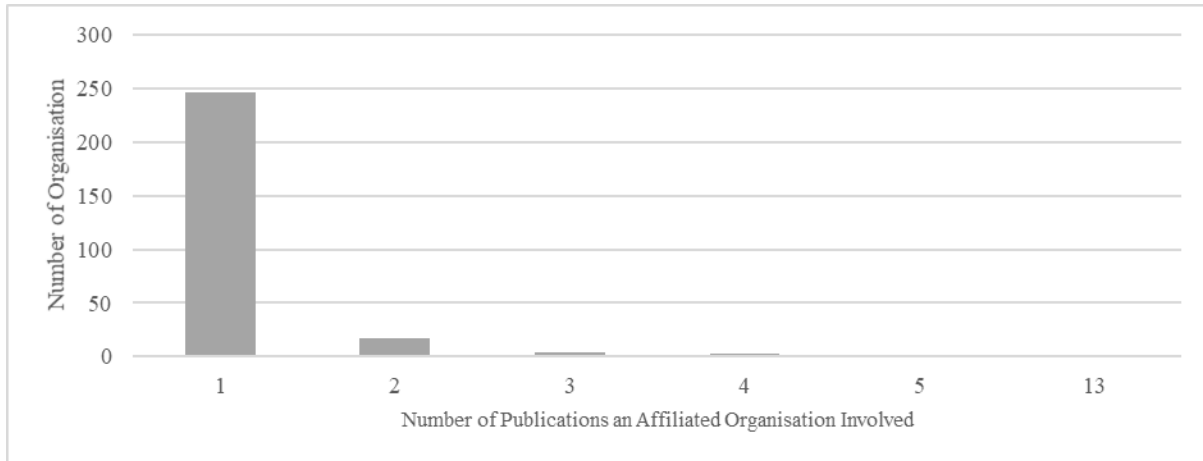
**Table 2. Authors with more than 1 paper**

Author Name (Chinese)	Author Name (Pin Yin)	Affiliated Organisation	Frequency
胡仪元	Hú yí yuán	Shaanxi Institute of Technology	4
刘永建	Liú yǒng jiàn	Changde Vocational Technical College	3
李强	Lǐ qiáng	Shaanxi Institute of Technology	3
罗勇	Luó yǒng	China Executive Leadership Academy Jinggangshan	3
周丽	Zhōu lì	People's Bank of China	2
张睿海	Zhāng ruì hǎi	Shaanxi Institute of Technology	2
李伟华	Lǐ wěi huá	Hebei Jiaotong Vocational and Technical College	2
王婉芳	Wáng wǎn fāng	Zhejiang Vocational College of Commerce	2
王建军	Wáng jiàn jūn	People's Bank of China	2
韩胜难	Hán shèng nán	Hebei Jiaotong Vocational and Technical College	2
黄新建	Huáng xīn jiàn	Nanchang University	2
闫天池	Yán tiān chí	Dongbei University of Finance and Economics	2

When considering the affiliated organisations of the authors, if a publication has more than one author from the same affiliated organisation, even from different departments of the same organisation, in this analysis it will add 1 count only for that organisation. If a publication has two different authors from two different organisations, then each of the affiliated organisations will have 1 count. As shown in Figure 7, the majority of the organisations (246, 90.11%) were



involved in 1 publication. There are 27 organisations involved in more than 1 publication. Among the 27 organisations with more than 1 publication, a non-academic organisation (People's Bank of China) was involved in 13 (4.56%) of the 285 selected publications. Only 8 out of the 27 organisations had more than 1 publication with at least one author who published more than 1 paper. The details of the publication frequency and type of these 27 affiliated organisations are presented in Table 3.



**Figure 7. Number of publications each affiliated organisation involved in the period covered by the review**

**Table 3. Affiliated organisations with more than 1 paper**

Organisation (Chinese name)	Organisation (English name)	Academic/Non- academic affiliation	Frequency	# Authors with > 1 publication
中国人民银行	People's Bank of China	Non-academic	13	1
陕西理工学院	Shaanxi Institute of Technology	Academic	5	3
中国科学院	Chinese Academy of Science	Academic	5	0
湖南农业大学	Hunan Agricultural University	Academic	4	0
沈阳农业大学	Shenyang Agricultural University	Academic	4	0
东北师范大学	Northeast Normal University	Academic	4	0
东北财经大学	Dongbei University of Finance and Economics	Academic	3	1
常德职业技术学院	Changde Vocational Technical College	Academic	3	1
南昌大学	Nanchang University	Academic	3	1
中国井冈山干部 学院	China Executive Leadership Academy Jinggangshan	Academic	3	1
陕西师范大学	Shaanxi Normal University	Academic	2	0

西安建筑科技大学	Xi'an University of Architecture and Technology	Academic	2	0
绵阳师范学院	Mianyang Normal University	Academic	2	0
福州大学	Fuzhou University	Academic	2	0
浙江商业职业技术学院	Zhejiang Vocational College of Commerce	Academic	2	1
河北交通职业技术学院	Hebei Jiaotong Vocational and Technical College	Academic	2	1
江西财经大学	Jiangxi University of Finance and Economics	Academic	2	0
东北大学	Northeastern University	Academic	2	0
新疆财经学院	Xinjiang Institute of Finance and Economics	Academic	2	0
山西师范大学	Shanxi Normal University	Academic	2	0
天津大学	Tianjin University	Academic	2	0
嘉应学院	Jiaying University	Academic	2	0
北京师范大学	Beijing Normal University	Academic	2	0
云南财贸学院	Yunnan University of Finance and Economics	Academic	2	0
云南省农业科学院	Yunnan Academy of Agricultural Sciences	Academic	2	0
中南大学	Central South University	Academic	2	0
中共中央党校	Central Party School	Academic	2	0

### *Co-authorship network*

There are 117 clusters of authors identified from the 285 selected papers. Figure 8 shows the co-authorship network with the nodes representing the author names and papers identifying numbers, and the edges representing the co-authoring relationships. The co-authorship network is very disconnected. Only 4 clusters of authors have co-authored more than 1 paper. The largest cluster (shown near the centre of Figure 8) with 7 (1.58% of 443) authors has co-authored 5 (1.75% of 285) papers together. These 7 authors are from 2 different higher education organisations, namely Shaanxi Institute of Technology and Hanzhong Vocational and Technical College.

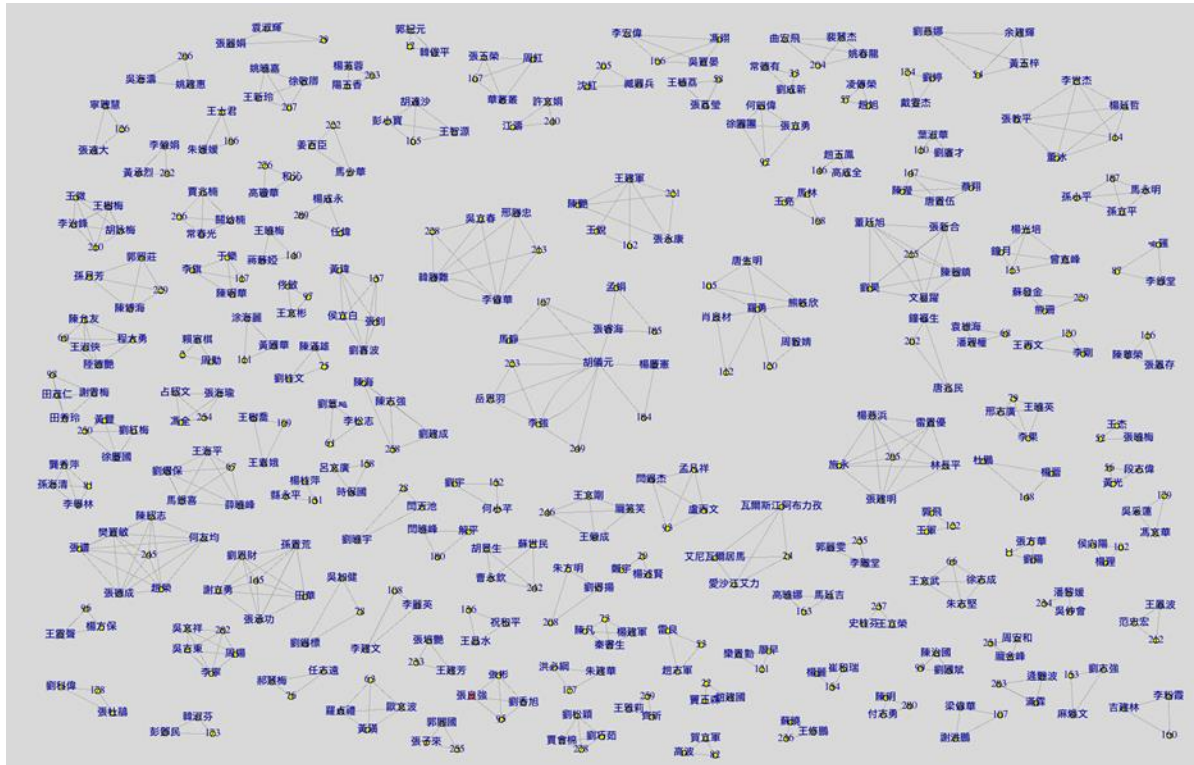


Figure 8. Co-authorship network of the selected publication

**Keywords and Topics Analysis**

For each publication, there are 2 to 10 Chinese keywords supplied by the authors, except one of the selected publication which has no keyword identified. In total, there are 1,469 Chinese keywords found in the selected publications. Since the same keyword can be used in multiple publications, with the duplicated keywords removed, there are 1,014 unique Chinese keywords identified. The overall number of keywords varied over time following, in general, an upward-sloping trend (Figure 9). In particular, in year 2007, the growth rate is 10.45%. The largest number of keywords (10.45%,  $n=106$  of 1014) was added in 2007 alone. The number of keywords involved in Chinese-language publications related to county development and sustainability achieved an average annual growth rate of 5.50% with standard deviation equals to 2.288 over the period covered by the review.

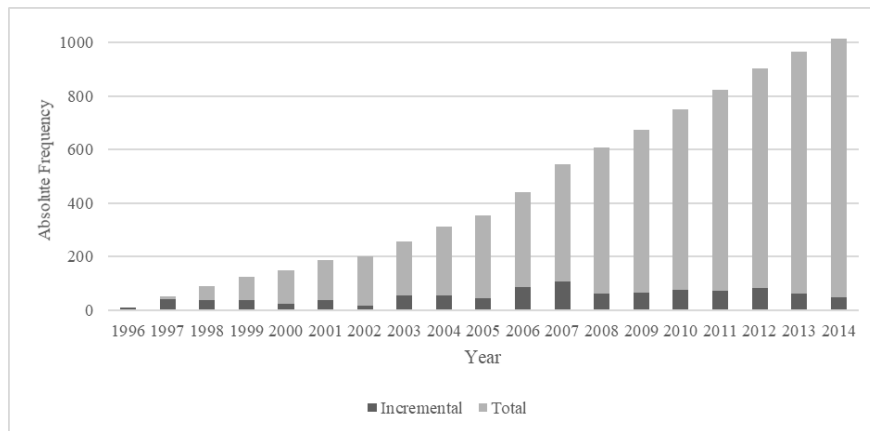


Figure 9. Annual total and incremental change in the number of keywords from 1996 to 2014

Most of the keywords ( $n=902$ , 88.95%) only appeared once in the selected papers. There are 150 unique Chinese keywords in the papers published in 1996-2000, 220 for the period of 2001-2005, 440 for 2006-2010, and 325 for 2011-2014. The distribution of keyword frequency for different time periods is shown in Figure 10.

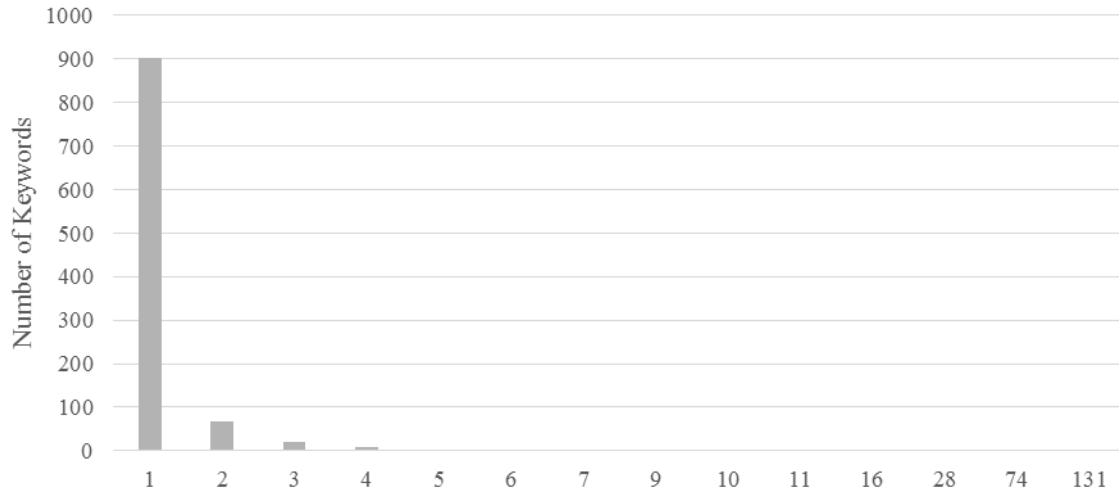


Figure 10. Number of publication each keyword appeared



Figure 11. Word cloud for 77 selected keywords appeared at least 2 times in the selected publications

112 keywords appeared at least twice in the 285 publications covered in the review. After removing some general terms related to county development and sustainability (county economy, sustainable development, county economic development, counties, development, economic development, sustainable, sustained development, economic sustainable development, sustainable development of county economy, model, path, etc), the remaining 77 words are used for further analysis. Figure 11 presents the wordcloud showing these 77 keywords; the sizes of the keywords are

proportional to their frequencies in the 285 selected publications. The top six most frequent keywords are: ecosystem, circular economy, agricultural industrialisation, county finance, ecological construction, and soil and water conservation.

From 1996 -2000 (See Table 4 to Table 7), the popular topics covered by the keywords included county development and sustainability models and approaches, social issues and utilisation of resources. From 2001 to 2005, keywords related to utilisation of resources become very popular, and additional new topics also emerged including geographical issues, industry, and water. From 2006-2010, more keywords related to agriculture and finance had become popular. From 2011-2014, keywords related to county sustainability models and approaches became popular again.

**Table 4. Keywords appeared at least twice in the publications from 1996-2000 covered in the review**

1996-2000			
Keywords (Chinese)	Keywords (English)	Topics	Frequency
经济增长方式	Economic Growth Mode	Models and Approaches	2
可持续发展战略	Sustainable Development Strategy	Models and Approaches	2
功能定位	Functional Orientation	Models and Approaches	2
科技进步	Scientific and Technological Progress	Models and Approaches	3
城乡一体化	Rural Integration	Social Issues	2
资源节约	Resource Conservation	Utilisation of Resources	2
生态环境	Ecosystem	Utilisation of Resources	2

**Table 5. Keywords appeared at least twice in the publications from 2001-2005 covered in the review**

2001-2005			
Keywords (Chinese)	Keywords (English)	Topics	Frequency
欠发达地区	Underdeveloped Areas	Geographical issues	2
支柱产业	Mainstay Industry	Industry	2
中小企业	Small and Medium Enterprises	Industry	2
发展战略	Development Strategy	Models and Approaches	2
县域经济增长	County Economic Growth	Models and Approaches	2
城镇经济	Town Economy	Social Issues	2
生态建设	Ecological Construction	Utilisation of Resources	5
生态环境	Ecosystem	Utilisation of Resources	5
森林资源	Forest Resources	Utilisation of Resources	3
可持续利用	Sustainable Use	Utilisation of Resources	2

资源优势	Resource Advantages	Utilisation of Resources	2
水土保持	Soil and Water Conservation	Water	3

**Table 6. Keywords appeared at least twice in the publications from 2001-2005 covered in the review**

2006-2010			
Keywords (Chinese)	Keywords (English)	Topics	Frequency
农业产业化	Agricultural Industrialisation	Agriculture	4
投资潜力	Investment Potential	Finance	2
县域金融	County Finance	Finance	2
金融支持	Financial Support	Finance	2
银行承兑汇票	Bank's Acceptance Bill	Finance	2
西部县域经济	West County Economy	Geographical	2
产业集群	Industrial Clusters	Industry	2
循环经济	Circular Economy	Models and Approaches	5
城市百强	City Hundred	Models and Approaches	2
循环经济模式	Circular Economic Model	Models and Approaches	2
指针体系	Index System	Models and Approaches	2
科技推广	Technology Promotion	Science and Technology	2
重点科技项目	Key Technology Projects	Science and Technology	2
欠发达地区	Underdeveloped Areas	Social Issues	4
人力资本	Human Capital	Social Issues	3
区域经济	Regional Economy	Social Issues	3
生态环境	Ecosystem	Utilisation of Resources	3
持续发展	Sustained Development	Utilisation of Resources	2
旅游资源	Travel Resources	Utilisation of Resources	2
水土保持	Soil and Water Conservation	Water	2

**Table 7. Keywords appeared at least twice in the publications from 2011-2014 covered in the review**

2011-2014			
Keywords (Chinese)	Keywords (English)	Topics	Frequency
县域金融	County Finance	Finance	2
金融支持	Financial Support	Finance	2
常德市	Changde City	Geographical	3
中部地区	Central Region	Geographical	2
产业结构	Industrial Structure	Industry	2
循环经济	Circular Economy	Models & Approaches	4
国家级贫困县	State-Level Poverty-Stricken Counties	Models & Approaches	2
发展模式	Development Model	Models & Approaches	2
发展路径	Development Path	Models & Approaches	2
欠发达地区	Underdeveloped Areas	Social Issues	3

**Citation and download analysis**

Analysis of the 285 papers identified a total of 890 citations and 36,378 downloads within the 18-year period from 1996 to 2014. The median number of citations per article was 3.12 (range 0-24) and the median number of downloads 127.64 (range 0-1771). Table 8 summarises the citation and download rate analysis according to whether the papers were published in high quality journals and/or whether research underpinning the paper received funding or not. Following Antoniou et al. (2015), a backward linear regression analysis was performed, removing insignificant independent variables one by one (Table 8).

**Table 8. Predictors of increased download and citation counts**

Variable	Multiple regression (Citation Counts)		Multiple regression (Download Counts)	
	Regression coefficient [95% CI]	<i>P</i> value	Regression coefficient [95% CI]	<i>P</i> value
High quality journal	1.950 [1.495, 2.542]	0.000	2.565 [1.495, 2.542]	0.000
General quality journal	Not included	NA	Not included	NA
Funding obtained	Not included	NA	2.291 [1.350, 3.888]	0.002
No funding obtained	Not included	NA	Not included	NA

CI, confidence interval; NA, not applicable

The expected number of citations for studies in high quality journals is  $EXP(0.668) = 1.950$  times the expected number of downloads for studies published in high quality journals, while holding all other variables in the model constant; the 95% confidence interval for this estimate is 1.495 to 2.542, and the *p*-value <0.001. There is no relationship between having funding or not with expected number of citations. The variance of downloads explained is 0.362

(adjusted  $R^2 = 0.122$ ). In other words, on average the papers published in high quality journals has 1.950 times more citation counts than those published in general quality journals, regardless of whether the research for the paper was supported by funding or not.

The expected number of downloads for studies in high quality journals is  $EXP(0.942) = 2.565$  times the expected number of downloads for studies published in general quality journals, while holding all other variables in the model constant; the 95% confidence interval for this estimate is 2.028 to 3.245, and the  $p$ -value  $< 0.001$ . There is also a significant difference between research with and without funding in predicting download counts (regression coefficient [95% confidence interval], 2.291 [1.350- 3.888;  $P = 0.002$ ].) The variance of downloads explained by these two factors is 0.465 (adjusted  $R^2 = 0.211$ ). Both journal quality and funding have impacts on download counts; for papers published in high quality journals, on average, they received 2.565 times more downloads than those published in general quality journals. The papers with funding support, on average, also received 2.291 times more download than those without funding.

## Discussion and conclusion

This review set out to assess the total number of journal papers dealing with sustainable county development in China, the key features or characteristics of the papers and the ways in which county development researchers engage with concepts of sustainability. Overall, the total number of papers on county development and sustainability has increased over time to reflect the worldwide emphasis—at least from the turn of the 21<sup>st</sup> century—on concepts of sustainability in development policy. Of the total 18,131 publications on county development in Chinese language over the review period only a small proportion, 2% (285 papers), were concerned with sustainability. Although the overall proportion is low, the total number of papers concerned with sustainability grew steadily from a single paper in 1996 to over 12 papers per annum from 2003 onwards. A similar review of rural development publications across the world's five continental regions found that only 4% (128 papers) were concerned with sustainability in 1988/9, but this proportion increased significantly to about 30% (535 papers) in 2008/9 (Evans, Lasen, & Tsey, 2015).

The role of the Communist Party in promoting sustainable county development in China cannot be overstated. Since the county economy and sustainability were first mentioned as a priority in the 2002 Congress Report of the Communist Party of China (Jiang, 2002), sustainable county development has become a priority in subsequent party and government reports including the Eleventh Five-Year Plan (2006-2010) (2007). Not surprisingly, from about 2003 onwards, county development researchers increasingly engaged with concepts of sustainability in their studies.

The provinces of Hunan (Midland China) and Hebei (Eastern China) contributed the greatest number of papers over the observed period while Tianjin and Shanghai in Eastern China, Neimeng and Guangxi in Midland China, Chongqing and Ningxia in Western China produced the least. The presence of scientific research institutions funding projects related to this field of research in Hunan and Hebei (such as Hunan University and Hunan Agricultural University in Hunan, and Beijing Normal University and Hebei Jiaotong Vocational and Technical College in Hebei) as against the relatively fewer funded projects in the other provinces may contribute to variations in publication output across the regions.

The number of authors involved in publications on county development and sustainability increased significantly from 1 author in 1996 to 443 in 2014. However, the co-authorship network is very disconnected. Only four clusters of authors have co-authored more than one paper. The relative immaturity and the multidisciplinary nature of the research field could account for the scattered publication frequency by each author, as well as the highly disconnected co-authorship network (Liu, Bollen, Nelson, & Van de Sompel, 2005). The evidence suggests that researchers are working in isolation with limited information flow between research teams. Clearly, research institutions and funding bodies need to promote greater networking and collaboration across the research clusters through knowledge-sharing workshops, forums, and the formation of special interest groups. This should promote knowledge sharing and value adding among county development researchers, and reduce the tendency to re-invent the wheel that comes with working in silos.

In a mature field of research, one would expect that some core keywords would be used consistently in many different publications over time. The continuously increasing number of new keywords used, and the high proportion of keywords used only once or a few times in the publications reviewed further suggests that this research area is still evolving. The range of issues and topics investigated in this research field is expanding and becoming richer. The top keywords (ecosystem, circular economy, agricultural industrialisation, county finance, ecological construction, and



soil and water conservation) highlighted the efforts and areas in existing research related to sustainable country development in China. Future reviews should focus on specific initiatives such as the circular economy and ecosystems in the context of agricultural industrialisation in order to determine what works and ways in which to translate such evidence into policy and practice more broadly.

Across all regions of China, authors from academia tend to publish their research in high-quality journals more than their non-academic colleagues. In general, the majority of the research (75%) was published in general-quality journals and only 25% was published in high-quality journals such as the Chinese Social Science Citation Index CSSCI and PKU Beijing University. On average, the papers published in high-quality journals are more likely to be cited and downloaded than those published in general-quality journals. Although rates of citation and download are poor indicators of research usage and impact, this finding is important as it suggests that for research to be useful, the quality of the research must be credible (Tsey et al., 2016).

Arguably this review has two limitations. Firstly, there is the difficulty of screening Chinese language papers using English-language systematic literature review tools such as PRISMA. The two authors who screened the publications are native Chinese language speakers with working knowledge of English, while the third reviewer, who was consulted regarding discrepancies, does not speak Chinese. Although the 90% agreement achieved between the two primary reviewers is high, there remains some possibility of concepts and ideas being lost in the to-and-fro translations between the Chinese and non-Chinese co-authors. Another limitation is the use of citation and download frequencies listed in CNKI as proxies for potential research usage and impact. Evidence of citation simply means the research is being used by other researchers to inform their work but says very little about the usefulness of the research to society. Downloads may suggest interest among practitioners and policy makers in using research to inform their activities, but again says little about the actual impact or benefit of the research. A related limitation is the use of an acknowledgement of source of funding in the publications as a proxy for evidence of funding for the research. While the acknowledged funding is not equated to all the funding sources in every case (some funding sources might be undisclosed or simply neglected), there is in general, a high correlation between funding sources and publication acknowledgment for reporting purpose. Hence, we believe that this limitation does not overly bias the results.

In conclusion, systematic scoping of literature and other evidence reviews and syntheses provide useful opportunities for researchers to evaluate total publication output over time, the people and institutions involved in funding and conducting the research, the quality of the journals in which the research is published, ways in which researchers in the field understand and engage with sustainability principles and concepts and the extent to which publications are cited or/and downloaded. While this information is important in identifying evidence gaps to inform future research, concerted effort is required to ensure that research is tailored first and foremost to meeting the information needs of research users. Study design quality, research design quality, impact and benefit are important elements in assessing the value and contribution of county economic development research and should be considered in future evaluations and reviews.

### **Acknowledgements**

We acknowledge the following for their support: Katrina Keith, and 'High End Foreign Expert of State Administration Award', Liaoning Province Government and Shenyang University of Chemical Technology to support Komla Tsey as visiting scholar in China.

### **Geographical information**

This research was conducted in China and Australia.

### **References**

- [1] Antoniou, G. A., Antoniou, S. A., Georgakarakos, E. I., Sfyroeras, G. S., Georgiadis, G. S. (2015). Bibliometric analysis of factors predicting increased citations in the vascular and endovascular literature. *Annals of Vascular Surgery*, 29, 286-292.
- [2] Bordons, M., Aparicio, J., González-Albo, B., & Díaz-Faes, A. A. (2015). The relationship between the research performance of scientists and their position in co-authorship networks in three fields. *Journal of Informetrics*, 9(1), 135-144.
- [3] China's Agenda 21: White Paper on China's Population, Environment, and Development in the 21st Century. (1994). *China Popul Today*, 11(4), 5-8.
- [4] Evans, N., Lasen, M., & Tsey, K. (2015). *A systematic review of rural development research: Characteristics, design quality and engagement with sustainability*. Cham: Springer.

- [5] Higgins, J. P., & Green, S. (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). John Wiley & Sons, Chichester, UK.
- [6] Jiang, Z. (2002). 16th national congress of the Communist Party of China, 2002. Retrieved from <http://www.china.org.cn/english/features/49007.htm>
- [7] Li, Q., & Hu, Y. (2012). Sustainable economic development in the county: Problems and countermeasures research. *Academic Forum*, 9, 123-125, 147.
- [8] Liu, X., Bollen, J., Nelson, M. L., & Van de Sompel, H. (2005). Co-authorship networks in the digital library research community. *Information processing & management*, 41(6), 1462-1480.
- [9] Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement. *PLoS One Medicine*, 6, e1000097.
- [10] Morel, C. M., Serruya, S. J., Penna, G. O., & Guimarães, R. (2009). Co-authorship network analysis: a powerful tool for strategic planning of research, development and capacity building programs on neglected diseases. *PLoS neglected tropical diseases*, 3(8), e501.
- [11] National Development and Reform Commission. (2007). Program of Action for Sustainable Development in China in the Early 21st Century. Retrieved from [http://en.ndrc.gov.cn/newsrelease/200702/t20070205\\_115702.html](http://en.ndrc.gov.cn/newsrelease/200702/t20070205_115702.html)
- [12] Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A., & McEwen, S. A. (2014). A scoping review of scoping reviews: advancing the approach and enhancing the consistency. *Research synthesis methods*, 5(4), 371-385.
- [13] Qi, Z. (2013). Domestic and international agricultural research literature: Statistical analysis and evaluation based on CNKI. *Northern Horticulture*, 190-194.
- [14] Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: A comprehensive guide*: John Wiley & Sons.
- [15] State Council of the People's Republic of China. (2007). The 11th five-year plan. Retrieved from [http://www.gov.cn/english/special/115y\\_index.htm](http://www.gov.cn/english/special/115y_index.htm)
- [16] Tan, Y., Xu, H., & Zhang, X. (2016). Sustainable urbanization in China: A comprehensive literature review. *Cities*, 55, 82-93.
- [17] Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence- informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207-222.
- [18] Tsey, K., Lawson, K., Kinchin, I., Bainbridge, R., McCalman, J., Watkin, F., . . . Rossetto, A. (2016). Evaluating research impact: the development of a research for impact tool. *Frontiers in Public Health*, 4.