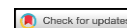




IMPACT OF PURCHASING POWER PARITY AND CONSUMPTION EXPENDITURE RISE ON URBAN SOLID WASTE GENERATION IN CHINA



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ABSTRACT

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The paper focuses on the socio-economic factors of municipal solid waste generation (MSWG) in China. China achieves a rapid economic development since the economic reforms adopted in 1978. The study shows that only 33percent of population lived in urban areas in 1985 that increased to 54 percent in 2014. Consumption expenditure rate increases to 3.96 percent and solid waste generation rose about 2.96 percent annually from 1990 to 2014. A huge amount of solid waste in urban areas causes serious environmental woes and human health hazards that are hindrance to sustainable urban development. The study aims at finding out the associational effects of purchasing power parity (PPP) and consumption expenditure rise (CER) on the solid waste production. The paper shows the negative association of purchasing power parity (PPP) and consumption expenditure rise with solid waste production and their relationship is significant at 5% level. In addition, rapid urbanization is positively correlated to consumption expenditure rise and it is significant at 5%level as well. I prepare the dataset using the extracted annual and national records of National Bureau of Statistics of China and World Data Indicator (WDI) from 2000 to 2015. I analyzed the data applying Correlation Matrix and Multiple Linear Regression Analysis. The findings will facilitate to formulate efficient solid waste management to sustainable urbanity.

Contribution: The paper's primary contribution is finding that purchasing power parity and consumption expenditure rise have a negative effect on urban solid waste generation. In addition, consumption spending growth is positively linked to rapid urbanization.

1. INTRODUCTION

China is considered a country of rapid economic growth compared to other countries in the world. Within 30 years, it achieved the second position in the world in terms of GDP growth though the USA remained the first position. Therefore, China emerged as an economic superpower to the world forum from the last decade of 20th century. It is a socialist country, but after 1978, it has been operating market socialism. Urban reforms from the middle 1980s initiated enterprise reforms and allowed opportunities for rural laborers. As the individual, private and foreign ownerships are gradually granted legal status; urban entrepreneurship has gained momentum, triggering the development of non-state sectors in Chinese cities. The non-state enterprises including urban collectives, private enterprises, and foreign-invested enterprises have progressively become the key driver of the

economic process in China (Li, 2016). China instantly stepped to the rapid track of economic and business growth at about 10 percent from 1978 to 2011 (Hu & Chen, 2015). Nevertheless, it is true that in the 60s, China had experienced a grave famine, that claimed around 30 million death tolls, and presently it has been an economic and business superpower.

Since 1978, China has achieved an enormous progress in all aspects including urbanization. The growth of urbanization was 17.9 percent in 1978 increased to 53.7 percent in 2013 (National Bureau of Statistics of China (NBSC), 2014). China has attained a significant economic prosperity and urban development in this time. Urban sociologist (Davis, 1965) provides a classic definition of urbanization; urbanization refers to the proportion of the total population converged in urban areas, or else to a rise in this proportion. Based on this definition, Hu (2008) asserted that the annual urban population growth rate in a country is much higher than the world's average. China's annual urban population growth rate was especially higher in the period from 1980 to 2005 and in this period, China was the major center of the world's urbanization development.

On the other hand, after opening up the economic and trade windows, the wave of globalization, westernization, MC Culture rushed to China and all walks of urban people received it instantly. Though China is a socialist country, it advances toward a consumer society considered. Mega supermarkets, luxurious cars, goods, and expensive electronic home appliances get popularity massively in all the urban societies. Urban populations not only eat up extra food, but they also consume durable goods enough. In the early 1990s, Chinese households in urban areas were two times more likely to host a TV, eight times more likely to have a washing machine, and 25 times more likely to have a fridge than rural households (Taylor, Hardee, & Karen, 1986). This increased consumption expenditure is a function of urban labor markets, wages and household structure. There is direct association between mass consuming spending and massive waste production. If consumption costs increases, solid garbage generation rises.

China faces diverse types of ecological woes due to mass consumption and thus solid waste handling. Urbanization equally affects the broader regional environments. Regions downwind from massive industrial complexes also see increases in the amount of precipitation, air pollution, and the number of days with thunderstorms (Goudie, 1987). Urban areas influence the weather services along with the runoff process to water. Urban areas normally cause heavy rain, but they decrease the infiltration of water and lower the water levels. Shanghai is an eastern metropolis, which has around 1.9 billion people, is stepping up efforts to handle city garbage estimated to increase to 20,000 tons a day, from the present 16,000 tons. The city gets the ability to recycle after the sorting of garbage worth of 10 percent by 2010. The remaining is buried or biochemically processed to produce useful resources like paper and metal goods (Li, 2016). In fact, garbage management has presently remained a crucial matter to all municipal governments in the world. All local governments have an effort to manage the waste however; these contaminate the nearby water, air, and soil. Only Sweden, Denmark reached about to zero waste situations. Along with the increase of urban population, consumption rate is on rising sharply that generates wastes at an appalling amount in Chinese urban zones.

2. LITERATURE REVIEW AND SETTING UP RESEARCH QUESTIONS

The previous study finds that rebound effects, in terms of green house gas (GHG), are modest (0–32%) for quantities impacting domestic energy usage, larger (25–65%) for measures affecting vehicle fuel use and very massive (66–106%) for measures that reduce food waste (Chitnis, Sorrell, Druckman, Firth, & Jackson, 2014). Urban waste production has direct effects of human every day practices, which is linked to consumption level. These are generally dependent on social, cultural, environmental, economic, and demographic factors (Li, Fu, & Qu, 2011). There is a causal link to wastages with purchasing power parity (PPP) growth, urbanization, and consumption spending. This study examines 1. The relationship between purchasing power parity (PPP) and waste generation is significant; 2. Urban household consumption expenditure effects negatively massive waste generation;

3. Urbanization has a positive association with consumption expenses. I examine how and how much do the independent variables correlates waste generations.

2.1. Purchasing Power Parity: Impacts on Waste Production

During the 30 years from 1978 to 2008, Chinese GDP maintained an annual average growth rate of nearly 9.8 percent, creating an internationally acknowledged 'economic miracle.' Along with the increase in per capita earnings and GDP, purchasing power parity (PPP) of Chinese people rises enormously. Between 1949 and 2008, the per capita disposable income of urban residents grew from less than 100 to 15,781 Yuan (Jun, Chunguang, Yi, & Ling, 2010).

I reviewed the studies based on the effects of disposal income per capita and PPP on solid waste production. A number of scholars carry out different studies on the matter like (Grover & Singh, 2014; Irwan, Basri, Watanabe, & Abushammala, 2013; Kamran, Chaudhry, & Batool, 2015; Kusch & Hills, 2017a; Medina, 1997; Oberlin, 2013; Soler, Gemar, & Jimenez-Madrid, 2017a). Kusch and Hills (2017b) showed that a high economic elasticity was identified, indicating that WEEE and GDP are closely interlinked. More detailed analyses revealed that GDP at purchasing power parity (GDP PPP) obtain a to a greater extent meaningful measure when looking at WEEE flows, as a linear dependency between WEEE generation and GDP PPP was identified. Soler, Gemar, and Jimenez-Madrid (2017b) conducted a research using principal component study, ordinary least squares (OLS), cluster analysis, and a mean test to create a comparison of data for the Province of Malaga's sub regions. The results confirmed an effective linked between municipal expenditure and waste generation, and focused on the environmental benefits of land use pattern involving environmentally non-aggressive crops.

As the family size and income per capita keep on the significant factors affecting the amount of solid waste from domestic consumption, a study on the association among these is vital to decision-making on waste management plan. Therefore, a study was conducted in Dehradun City to discover the links between household solid waste generation, family size, and income (Grover & Singh, 2014). Presenting with Kamran et al. 2015, no significant difference was found in an overall waste generation; however, statistical analyses indicate the significant difference for food waste, paper, and plastic ($p < 0.01$) among socioeconomic parties and seasons. The results showed that the lowest income group of families produces 0.39 kg per capita day during winter seasons which represent the minimum of MSW produced as compared to the high (1.1 kg per capita per day) and middle (0.56 kg per capita per day) income groups of people in the same months.

Medina 1997 runs a study on 123 UN Countries to examine the relationship between earnings and municipal solid waste and he assessed the relationship among city solid waste generation rates and income is assumed to be a direct and positive one. The present paper analyzes this relationship for 123 countries, based on data collected from the United Nations. It discovered that instead of a straight line, solid waste generation shows a curvilinear figure as income rises. The proposed model indicates a transitional pattern: as a nation develops, its waste generation volume increases; then for middle and upper-income countries a transition takes place, in which waste generation and income show an extremely weaker relationship, and for the wealthiest countries, their waste production rates actually decrease.

I view from the literature review stated above that the study on the effects of PPP on garbage generation has been done a very few. All researchers conducted the study majorly on the impacts of per capita income on waste; even the results of the works show the relationship between the two variables is significantly positive. I examine in present research work how the PPP influences urban waste generation in China.

Q1. How does PPP effect urban solid waste production?

2.2. How Consumption Expenditure Rise Correlates Waste Generation

The second probable association between urbanization and mass waste generation prevails that I investigate by reviewing previous research papers. I found the research scope of existing studies and thus I set up hypothesis. In previous days, economist established a relationship between social-economic factors and household solid waste (HSW) generation. Some studies found that an increase in income alteration the consumption patterns of households, resulting in changed quantities and patterns of household waste production (Bandara, Hettiaratchi, Wirasinghe, & Pilapiiya, 2007a). He also showed that the socio-economic factors like age, income, and education level contribute considerably to variations in HSW generation. Humans are facing strongly interlinked economic, social, and environmental crises that stem, in large part, from current unsustainable patterns of consumption and production (Clay, 2011). Humans are now consuming more resources ever, both per person and in absolute terms (Zaman & Lehmann, 2013). The rapid increase in production and consumption, urban society rejects and generates solid material, which leads to significant increase in the quantity of debris generated from several sources like domestic garbage, commercial wastes, institutional, and industrial wastes. Wastes that arise from a typical urban society composed of garbage, rubbish (package materials) construction and demolition debris, hazardous wastes, etc. Rajput, Prasad, and Chopra (2009a). The fastest rate of electronic usage increase is experiential in developing countries, with a 50% annual increase in several nations. However, in the EU WEEE is also expected to grow, at an annual rate of 2.5–2.7%, until 2020, which would generate 12.3 million tons of WEEE by 2020 (Mihai, Gnoni, Meidiana, Ezeah, & Elia, 2019).

It is estimated that one-third of edible food produced for human consuming is lost or wasted globally every year (Göbel, Langen, Blumenthal, Teitscheid, & Ritter, 2015). Solid waste generation is an inevitable effect of production and consumption activities. Population growth increases the quantity of municipal solid waste considerably. However, the generation can equally vary with the level of income, urbanization trend, changing food habit, social and cultural ways, and lifestyle (Mahees, Sigayoganathan, & Basnayake, 2011a). The previous research showed the waste generation is influenced by consumption. Actually, the studies discussed using up volumes, habits, and pattern; but not the household consumption expenditure, that triggers the waste composition. I estimate in the study how the rises of household consumption expenditure gear up waste production.

Q2. How does consumption expenditure rise influence urban waste production?

2.3. Urbanization Influences the Consumption Expenditure

I critically reviewed the existing studies that are done on the effects of urban consumption rise. Whether urban population growth affects the consuming volume, expenditure or not I investigated in this part. With urbanization and rising per capita income, typical dietary patterns are shifting towards consumption based on animal items, requiring increased water, land, and energy (Pimentel & Pimentel, 2003) and increasing greenhouse gas emissions (Carlsson-Kanyama & González, 2009). Shu-bo (2010) investigated the relationship between the consumer demand and the population urbanization was analyzed by the method of econometrics employing the statistical data from 1978 to 2008 in China as a sample. The demonstration analysis showed that the increase of the urbanization pattern has been determined the growth of consumer demand.

Gungor and Simon (2017) investigated the relationship between energy consumption, financial development (FD), industrialization, and urbanization in the case of South Africa for the period of 1970–2014. The study employed Johansen co-integration test and vector correction model with Granger relation test as a view technique. In addition, urbanization, financial development, and industry are strongly linked to the energy consumption in the end. The results obtained the long run bi-directional causality between industrialization and power consumption, financial development and energy consumption, and further FD and industrialization.

The increasing urban population results in larger changes of consumption structure of urban and rural residents through increased urbanization, a necessity to the national economic prosperity. Taking the data from

2002 to 2012 in Guangxi as an example, this paper analyzes the trend of consumption structure and the differences between consumption structure of urban and rural residents with the usage of chart qualitative analysis and general gray correlation analysis. Urbanization has affected household appliances and services, transportation and communication among urban consumption; and entertainment service consumption, transportation, housing, and communication among rural consumption (Rong, Cheng, & Wei, 2014a).

Q3. Which type of association is there between urban population growth and consumption expenditure rise?

3. MATERIAL AND METHODS

3.1. Data

The present study employs data from National Bureau of Statistics of China (NBSC) (see <http://www.stats.gov.cn/enGLISH/Statisticaldata/AnnualData/>). The NBSC is a national official statistical platform in China that establishes the database annually collecting statistical records from local Administrative Bodies of Public Affairs on socioeconomic, cultural and environmental indicators on a regular basis. In addition, the Bureau produces data set following regular survey and national census. In China, the survey questionnaire, sample size, and methods, respondents' details, response rate are hardly open; so, I merely collect the finished data (growth rate) for the study. It has collaboration with United Nations Statistical Commission (UNSD) World Bank Indicators (WDI) and other international statistical institution to adjust and validate applied mathematics resources globally. The study uses the national data of urban areas recorded at the annual basis ranging the years from 2000 to 2015; yet, several variables range the time span from 2004 to 2015. The dataset of the study includes ten variables like disposable income, urbanization, PPP, consumption expenditure, solid waste generation, food consuming, clothing, durable goods, and water consumption. All variables bear mainly growth rate in percentage. We measure the variables in percentage, as we would like to assess the coefficient of correlations among them to the extent of their changing level or increase level. For example, I examine how urban population growth affects the household consumption expenditure.

3.2. Data Analysis Plan

The analysis part includes the following steps, after providing descriptive statistics of variables. Descriptive statistics have divided into two parts like graphical presentation and table data (means, standard deviation, and coefficient of variance). The line graphs present the year wise growth rate of solid waste generation, urbanization, consumption expenditure, and purchasing power parity (PPP). These statistics actually function as supportive tools to prove the significance of the association by regression analysis. Second, I examine the links among variables using correlation matrix. Thirdly, multivariate linear regression has applied to estimate the magnitude of correlations between dependent and independent variables that show the study results or findings. I implement solid waste generation and urbanization as dependent variables and consumption expenditure and PPP are for independent variables.

4. RESULTS

4.1. Descriptive statistics

Descriptive statistics offer primarily basic statistics of the variables related to the research questions that support to determining the ultimate results through regression analysis. We use both graphs and table statistics for the explanation of growth rate and interrelations among the variables. Urban solid waste generation and PPP, city population rise and consumption expenditure and urban waste and consumption spending growth relations have been described in Figure 1 A, B, C. Figure 1 A displays the comparative increase and decrease percentage of scrap generation and purchasing power parity from 2004 to 2015 in China. Waste generation occurred 0.66 percent in 2004 that increases to 7.18 percentages through a heavy fluctuation.

A: Comparative growth rate of waste generation and PPP

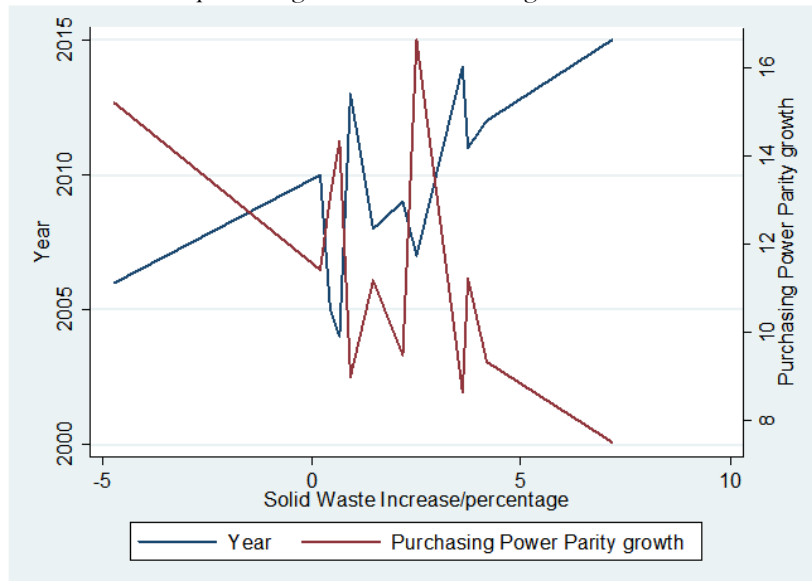


Figure-1. Graphical presentation of descriptive statistics.

PPP growth rate got 14.34 percent in 2004 which rose to 16.63 percent in 2007 and decreased to 7.47 in 2016. It shows the gradual decline of PPP from 2004 to present. Table 1 displays the means of MSW is 1.86 and SD is 2.88; on the other hand, PPP means and SD are 11.12 and 2.95 respectively.

B: Comparative growth rate of waste generation and consumption.

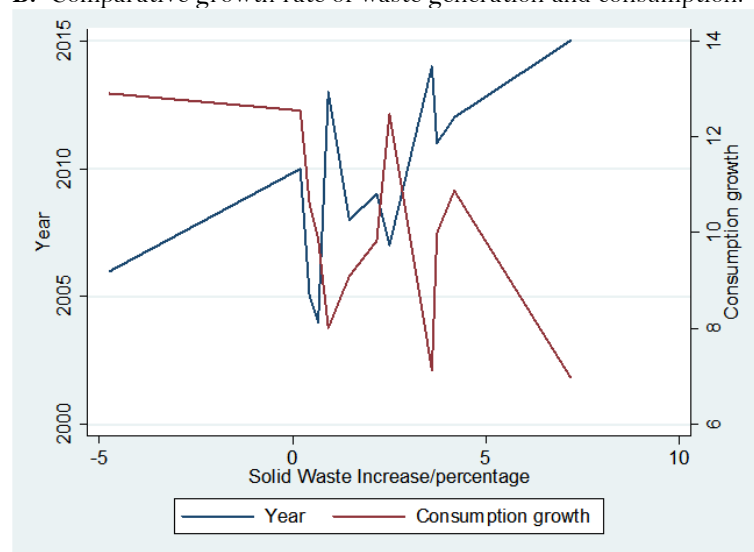


Figure-1. Continue.

Figure B presents the growth facts of MSW and consumption expenditure comparatively from 2004 to 2015. In fact, the graph shows that consumption expenditure growth has been done more than that of MSW. I examine MSW increases slowly to 7.18 percent in 2015 through a sharp fluctuation; whereas consumption expenditure growth decline steadily from 12.47 in 2007 to 6.98 percent in 2015. Table 1 offers household consuming expenditure increase means is 10.03 and MSW growth means is 1.86 that expresses a strong gap between the variables. Figure C shows consumption and urban growth in that we view the two variables increase rate reduced gradually from 9.87 and 3.64 in 2004 to 6.98 and 2.94 percent in 2015. Even, the averages and SD of consumption are 10.03 and 2.00; whereas 3.54 and 1.2 are for urbanization.

C: Comparative growth rate of urbanization and consumption.

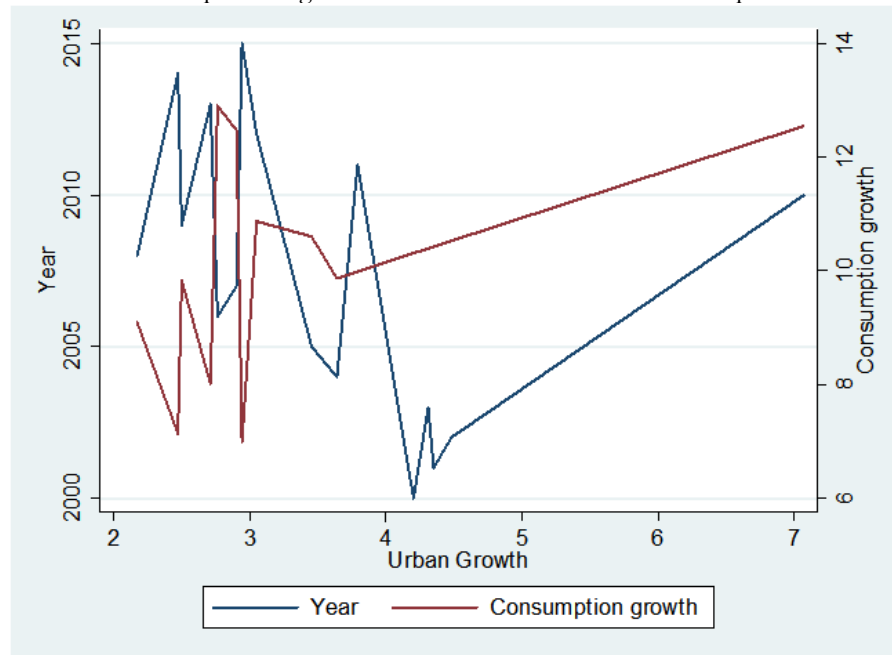


Figure-1. Continue.

Table 1 display the mean, of income growth, food consumption, clothing and consumer goods is 11.61, 8.04, 9.2, and 9.77 whilst 3.07, 6.6, 8.48, and 4.78 for the standard deviation of the variables respectively.

Table-1. Descriptive statistics

Description	Mean	SD	CV
Solid Waste Generation	1.86	2.88	1.55
Urbanization	3.54	1.2	0.34
Income Growth	11.61	3.07	0.26
Purchasing Power Parity	11.12	2.95	0.26
Consumption Expenditure Rise	10.03	2	2
Food Consumption	8.04	6.6	0.82
Clothing	9.2	8.48	0.92
Consumer Goods	9.77	4.78	0.49
Water Consumption	2.68	2.32	0.86

4.2. Purchasing Power Parity Impacts on MSWG

The prior studies showed a positive and significant association between GDP per capita income and MSW. But the present study results show a moderate negative and significant correlation between PPP and MSW. Table 2 displays a significant negative correlation between PPP and MSW as $r=-0.61$ and $p=0.035^1$. Table 3 offers the coefficients of PPP is -0.604 and that is significant is at 5 percent level. It means if PPP increases 1 percent, MSW decreases -0.62 . In addition, the mean of PPP growth is 11.12 whereas only 1.86 for MSW that offers negative significant relations.

¹P value is in parenthesis. Available on request.

Table-2. Correlation Matrix

Variables	Solid Waste generation	PPP	Consumption Expenditure	Urbanization	Income	Water consumption	Food	Clothing	Consumer goods
Solid Waste Generation	1								
PPP	-0.61**	1							
Consumption Expenditure Rise	-0.5**	0.79***	1						
Urbanization	-0.11	0.35	0.48**	1					
Income	-0.13	0.33	0.31	-0.08	1				
Water Consumption	-0.27	0.3	0.38	0.18	0.2	1			
Food	0.29	0.22	0.24	-0.02	0.37	-0.25	1		
Clothing	-0.37	.87***	0.64**	0.48	0.2	0.07	0.41	1	
consumer Goods	-0.22	0.13	-0.01	-0.57	0.27	0.09	0	-0.08	1

Note: ** denotes p value > 0.05.

*** denotes p value > 0.01.

4.3. Urbanization and Consumption Expenditure Growth Relations

The results of past researchers showed the positive correlation between urbanization and consumption. Whether there is a positive relation between *urbanization and consumption expenditure*, it has not been investigated yet. The present work shows the positive significant correlation between them. Table 2 displays there is a significant association between *urban growth and consumption expenditure rise* as $r = 0.48$ and $p \text{ value} = 0.04^2$. The coefficient value of consumption expenditure is 0.69 that is significant at 5 percent level. It expresses when 1 percent for urban growth increases, consumption expenditure grows 0.69 percent Table 4. Moreover, Figure 1.B shows both urbanization and consumption expenditure lines are growing in the same directions i. e. the growth rate of both variables is reducing steadily.

Table-3. Multiple linear regression analysis.

Variables	Coefficients	Std. Err.	P Value
Solid Waste Generation	11.94	5.407	0.43
Urbanization	0.324	0.84	0.72
Consumption Expenditure	-0.813**	0.87	0.043
Income	0.122	0.52	0.68
PPP	-0.604**	0.72	0.035
Water Consumption	-0.27	0.3	0.39
Food	0.141	0.37	0.37
Clothing	0.089	0.41	0.22
Consumer Goods	0.083	0.23	0.49

Note: ** denotes $p \text{ value} > 0.05$.

4.4. Effects of Consumption Expenditure Growth

Consumption expenditure rise affects MSWG negatively in the present study though prior studies showed significant positive relations between consumption (consumption pattern and volume) and MSW. Table 2 offers a negative and significant association between consumption expenditure and MSWG ($r = -0.81$ and $p = 0.042$). Table 3 shows consumption expenditure growth affects negatively as its coefficient is -0.5 which is significant at 5 percent level. It is noted that 1 percent consumption expenditure rise effects in decreasing -0.50 percent MSWG. Apart from, Figure 1.B displays a contrasting growth line i.e. consumption expenditure line grows downward whereas MSWG growth line runs upward. That means a negative relationship between them.

Table-4. Regression coefficient between urbanization and consumption expenditure rise.

Variable	Coefficient	Std. Err.	P Value
Urbanization	-0.83	4.71	0.72
Consumption Expenditure	0.69**	0.61	0.043
Income	-0.12	0.4	0.68
PPP	-0.009**	0.59	0.035
Water Consumption	-0.31	0.46	0.39
Food	-0.01	0.22	0.37
Clothing	-0.04	0.33	0.22
Consumer Goods	0.02	0.13	0.49
Adj. R-squared	=-0.497		
F =0.48	F =0.48		

Note: ** denotes $p \text{ value} > 0.05$.

5. DISCUSSION

I discussed about the findings whether they are accepted as new contributions to academic areas. I found out three findings from the statistical results that are shown significant in correlations between respective variables. The three findings are-First, purchasing power parity (PPP) makes a significantly negative effect on urban solid

² P value is shown in parent thesis. Available on request.

waste generation. Second, urban growth is positively correlated with consumption expenditure. Third, there is a negatively significant correlation between consumption expenditure growth and waste generation.

First, there is a few research works on the correlation between PPP and waste generation. For example, [Kusch and Hills \(2017b\)](#) showed a high economic flexibility was identified that indicating the WEEE and GDP are positively interlinked. Further analyses revealed that GDP at purchasing power parity (GDP PPP) is a more important tool when looking at WEEE flows, as a linear dependence between WEEE generation and GDP PPP was determined. Apart from, per capita GDP income growth is positively connected to solid waste generation. For an instance, [Soler, Gemar, and Jimenez-Madrid \(2017c\)](#) conducted a research using principal component analysis, and cluster analysis in two stages and a mean test to make comparison the data for the Province of Malaga's sub regions. The results confirmed a positive relationship between municipal expenditure and waste production that highlighted the environmental benefits of land use involving environmentally non-aggressive crops. But the present study shows PPP is correlated to waste production negatively and significantly. So, the finding does not belong to the extension of the prior research work. Now I examined whether the finding is practically argumentative, logical, and significant. GDP means the gross valuation of national total productions, but PPP is regarded as real income of population, which they can afford to purchase their commodities. Therefore, Chinese peoples' consumption capacity is not as high as prediction generated based on GDP calculation. In addition, inflation, exchange rate, poverty, and inequality rate do not go favorably. Therefore, purchasing power is lowered means consumption volume is declined which responsible for the waste reduction. The rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources such as, domestic wastes, commercial wastes, institutional wastes and industrial wastes. Wastes that arise from a typical urban society comprises of garbage, rubbish (package materials), construction and demolition wastes, leaf litter, hazardous wastes, etc. [Rajput, Prasad, and Chopra \(2009b\)](#). Moreover, technical engagement to consumer products makes efficiency in the consumer culture that reduces the solid waste generation in China. As consumption rate and volume are not higher enough in terms of PPP compared to the extent of GDP growth, waste generation, in fact, on reducing trends in China. We can accept the positive and significant correlation between PPP and MSWG and that is a key finding in the study.

Second, Urbanization has affected household appliances, service, transportation, communication among urban consumption, and entertainment education and cultural service consumption, housing, transportation, and communication among rural consumption ([Rong, Cheng, & Wei, 2014b](#)). [Li and Lin \(2015\)](#) conducted a study using the balanced panel data over the period 1985-2009 and STIRPAT model, for examining the impacts of urbanization on resource consumption and emissions under different levels of development. The main conclusions show that population size, per capita income, and economic structures are the important factors to affect the environment. Overall, the relationship between urbanization, resource consumption and emissions is positive. It is viewed from the past studies that there is a positive relation between urbanization and consumption. The present study results show a positive association between urban growth and consumption expenditure and this is evidence that this finding is the extension of prior studies.

It is logical and argumentative that if the volume of consumption increases, consumption expenditure increases consequently unless inflation remains rational. China is a country of 3.5 percent inflation. So, urban people earn more enough that encourage them to consume more incurring a massive amount of expenditure. That's why; urban growth influences the rise of household consumption expenditure.

Third, consumption is responsible for the waste generation that has been proved by many prior researchers. For example, income can change the consumption patterns of households, resulting in changed composition and quantities of household waste [Bandara, Hettiaratchi, Wirasinghe, and Pilapiiya \(2007b\)](#). He also showed that the socio-economic factors such as age, income and education level also contribute significantly to variations in HSW generation. Solid waste generation is an inevitable consequence of production and consumption activities.

Population growth can increase the amount of municipal solid waste significantly. However, the generation can also vary with the level of income, urbanization trend, changing food habit, social and cultural habits, and lifestyle (Mahees, Sigayoganathan, & Basnayake, 2011b). Whether consumption expenditure growth affects solid waste generation which had not been studied yet. So, we examine what is the effect of consumption expenditure on solid waste production and we can assess the negative relationship between them. In fact, the rise of consumption efficiency and finished and technically processed consumption plays a vital role in controlling waste generation. To some extents, consumption expenditure rises but consumption volume does not increase resulting in waste generation check. Finally, it is observed that consumption expenditure rise plays a negative role in a solid waste production.

Key findings: the results and discussion offer 3 key findings of the study: A. PPP has a negative correlation with solid waste generation; B. urban growth is positively correlated to household consumption expenditure; C. consumption expenditure growth plays a negative role in the urban solid waste generation. The study belongs to a limitation regarding data collection such as we cannot collect raw data from field survey because of the barrier of Chinese Language. On the other hand, Chinese most of the websites are in Chinese that bar to data collection. Apart from, global open data sources are not enough for Chinese year wise data on a set of specific variables. We recommend several sub fields of waste generation for further research to the new researchers such as what are the effects of educational attainment, public health expenditure, and human behavior on the urban waste generation?

6. CONCLUSIONS

Chinese socio-economic sectors are rapidly expanding of which urban solid waste generation is on steadily raise – the mean of waste growth is 1.86 – that affects the ecological services seriously. The study principally investigates the socioeconomic causal factors to waste generation. The work found three key findings affecting waste production and of them two is negative and one is positive contributor to waste production. *First, purchasing power parity (PPP) makes a significantly negative effect on urban solid waste generation. Second, urban growth is positively correlated with consumption expenditure. Third, there is a negatively significant correlation between consumption expenditure growth and waste generation.* So, it is observed that GDP income growth, population, consumption volume and pattern, inadvancement of the waste management process, priority for growth based development are considered major causes for the waste increase. But the key findings of the study are very important to collect data and information about the waste generation that would be a key source to formulate national and provincial waste policies. Apart from, new waste researchers, urban planners, environmental workers, policy makers can be benefitted from the study findings. Policy makers should prioritize sustainable development, introduce efficient waste management technology, home waste sorting, waste tax, land filling tax, and reuse, recycle, and reduce policy.

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