

## (Section A: Planning Strategies and Design Concepts)

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# Study on the Strategies of Regional Cooperative Funeral Facilities:

## *A Case Study of New Taipei City, Taiwan*

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**Abstract:** For a long time, funeral facility sites and management by the local government in Taiwan have been lacking cross-regional resource integration and location-based research. As a result, funeral facility locations have become inappropriate, excessive or insufficient in supply, etc. New Taipei City is located adjacent to Taipei City and Keelung City. The number of funeral facilities is as high as 264. How to plan funeral facilities appropriately and in cooperation with neighboring local governments has become an important issue for the New Taipei City government. This study reviews the theory of regional cooperation, and the main topic of the research is the public columbarium buildings and public cemeteries in New Taipei City. In addition, the service radius of funeral facilities in the three cities is studied to identify both service area and distribution, as while as using a time series model to estimate the supply and demand situation of public cemeteries and public columbarium buildings. It is intended that the result may be used to develop a regional cooperation strategy for future funeral facilities in New Taipei City. The conclusions are as follows: (1) the location of existing funeral facilities in New Taipei City are uneven, resulting in the residents' use of funeral facilities in other cities; (2) the funeral facilities' percentage of use is uneven in New Taipei City, with some regions facing imbalance between supply and demand by 2025; (3) the funeral facilities in New Taipei City can be developed according to four aspects and nine strategies through regional planning, renewed facilities, management systems, and regional cooperation; (4) a public cemetery near Taipei City or Keelung City should be planned as a regional cooperative demonstration project; (5) the three cities should reduce or standardise the charges (such as exemption of cross-county fees) as a priority policy for encouraging regional cooperation..

## 1. INTRODUCTION

Exchanges between cities have become more frequent, and governments must face the issue of how to use regional cooperation to deal with increasingly complex metropolitan problems. In recent years, funeral facilities have been difficult to build in local government areas due to them being NIMBY, 'not-in-my-backyard', facilities which attract local resident resistance. New Taipei City is located in the Taipei metropolitan area, and it is the most populous city in Taiwan and covering a large surface area.

Although there are 264 public cemeteries and columbarium storage facilities, cremation fields and funeral parlors are suffering a shortage due to the difficulty of building these facilities. This has caused New Taipei City citizens to use cross-regional funeral facilities. This problem has also occurred in Taipei City and Keelung City, especially due to the fact they have a smaller land area than New Taipei City. As citizens use public facilities as a general norm, the New Taipei City government must face the issue of how to use regional cooperative funeral facilities along with Taipei City and Keelung City. Therefore, this study reviews the theory of regional cooperation, and the main research object is the public columbarium buildings and public cemeteries in New Taipei City. Also, the service radius of funeral parlors, cremation fields, public columbarium buildings and public cemeteries in New Taipei City, Taipei City and Keelung City is studied. At the same time, the supply and demand of public graveyards and columbarium buildings in the three cities are estimated using a time series model and the research demonstrates the necessity of cross-regional cooperation of funeral facilities in the three cities. Based on the study, strategies should be developed to encourage neighboring cities' cooperation through future funeral facilities' policy. The results can be used as a reference for future regional cooperation between funeral facilities in New Taipei City.

## **2. LITERATURE REVIEW**

### **2.1 Regional Cooperation Factors and Trends**

In the situation of globalization and urban area competition, regional cooperation and alliance have become a trend in the new era ([Chiu, 2015](#)). The collaborative development of urban planning systems is one of the deciding factors in sub-regional cooperation ([You et al., 2017](#)). In particular, rapid changes and developments in today's political, economic and social structures have led to a decline in the ability of government departments to respond to public issues in the past. Many public issues have escaped the division of works in traditional government departments and across the borders of the administrative district ([Li & Chan, 2004](#)). It is necessary to solve problems that are difficult to handle through the combination of local governments, private companies, community groups and non-profit organizations through cooperation, community cooperation, public-private partnerships, or administrative contracts. In other words, cross-domain governance covers cross-sector organizations, geospatial cross-regions, partnerships that break away from public-private divisions, as well as professional cooperation across various policy domains; it requires a cross-domain, cross-regional and cross-sector governance model that works in a coordinated and collaborative manner.

In addition to the needs for regional cooperation under a trend of global competition, it is imperative that local governments seek cross-domain cooperation due to constraints on space and land resources. The cross-domain cooperation of local governments is mainly caused by the following four restrictions, (1) repeated input of resources, causing waste; (2) the need to form management for areas in 'no man's land'; (3) a lack of common goals, making each other irrelevant; (4) resource competition, mutual comparison ([Chen, L. H., 2008](#)). Therefore, it is usually necessary for the public and private sectors to jointly establish a cooperation mechanism, and

it is necessary to have certain agreements or consensus to encourage local governments to achieve regional cooperation. Only through intergovernmental relations, public-private partnerships and collaborative partnerships, which integrate different governments, different government organizations, and private and non-governmental organizations, can citizens establish governance across network boundaries ([Li, 2009](#)). Through the establishment of a partnership approach by local governments ([Chen, L. H., 2008](#)) across four elements such as capital, organization, control rights and plans ([Chen, Y. F., Lin, & Cheng, 2015](#)) can common problems be solved and their benefits and achievements shared to achieve a multi-win situation of cross-domain cooperation.

## **2.2 Taipei metropolitan area cross-domain cooperation history**

### **2.2.1 Formation of Taipei metropolitan area and causes of cross-region cooperation**

Urbanization represents high population density, high traffic volume and a high rate of commercial activities, and "metropolitan" refers to agglomerations of cities and consists of a prime city and other geography-related, economics related secondary cities or suburban governments. ([Zhang, 1978](#); [Hamilton, 2014](#)). Globalization is incentivizing the development of global metropolitan areas, becoming a key engine for the development of the world economy and countries; Taiwan is no exception. ([Chou, 2014](#)). In recent years, under the wave of globalization and with its efficient transportation network, the city of Taipei City, New Taipei City and Keelung City have become the largest metropolitan conglomeration in Taiwan. According to statistics, the total population of the Taipei metropolitan area is about 7 million. Nearly 30% of the population of the entire island is concentrated there. In recent years, due to the government's promotion of various economic and transportation construction activities, the urban function has been continuously improved, employment opportunities and income have increased, and the public facilities in the city have been efficient and diverse, promoting the city through a magnet effect. The Taipei metropolitan area has gradually formed a community sense of life ([Peng, 2006](#)). As the Taipei metropolitan area moves beyond metropolitan administrative jurisdiction to being a functionally oriented metropolitan area, regional issues become a common problem that neighboring local governments must face. These problems include regional water use, transportation, waste disposal, construction of waste soil, air pollution, etc. It is only through establishing a mechanism of local government cooperation by regional governance or metropolitan governance, that local governments can mutually interact with each other, share resources, and jointly resolve regional differences to avoid the dilemmas of their own governance, and to lead to the common development of the entire region ([Li, 2004](#)). The purpose of establishing cross-region cooperation in northern Taiwan is to solve cross-region issues.

### **2.2.2 Taipei metropolitan regional cooperation development and problems**

According to ([Liu, M. T. & Hsu, 2011](#)) , there was a regional cooperation organization in 1978. Taipei City and New Taipei City

composed the Tamsui River Remediation Working Group in 1995. In 2004, the heads of the northern counties and cities jointly established the “Northern Taiwan Seven County Forum” to sign a regional cooperation memorandum which was the predecessor of the North Taiwan Commission. In 2006, it was transformed into the “North Taiwan Regional Cooperation Development Promotion Committee”. The purpose was to promote the regional cooperation of local governments in northern Taiwan, break the invisible regional barriers of the administrative boundaries, and share the resources of each other through the integration of regional forces, to create a common development prospect of mutual assistance ([Chiu, 2015](#)). Every year, the counties and cities in Northern Taiwan take turns to take part in the election, and cooperation issues are discussed through the Meeting of Heads or Deputy Heads, and after seeking consensus, a number of cooperation plans will be jointly drafted to serve as a cooperation model for the common governance of the metropolis across different regions.

Although in terms of geographical area, the counties and cities in the northern Taiwan region are all inclusive, they often face difficulties in their actual operations: 1) the rigidity of local institutions disadvantages the local and regional competitiveness in the broader world; 2) the scale of local autonomy is not enough to effectively integrate and use resources; 3) the selfish-departmentalism of jurisdictions in the area leads to conflicts; 4) differences in the attributes of the local heads of political parties have led to a reduction in the willingness to cooperate and can also lead to conflict; 5) there is a lack of coordination in urban planning; 6) The effectiveness of the regional coordination platform has not been demonstrated ([Chen, L. G. & Li, 2003](#); [Liu, K. L., 2006](#); [Liao & Zhang, 2009](#)). However, under a trend of globalisation and localised governance, from the national government level down to the local township offices, government bodies should think about how to integrate resources in the region and configure them, even though the cooperation between counties and cities, through the cooperation of the administrative departments, and have the resources used effectively to enhance their competitiveness. For a long time, the Taipei Metropolitan Area has achieved certain results in disaster prevention and rescue, river basin management, traffic construction, waste disposal and more through a cooperation model across counties and cities. But cooperation with funeral facilities has only gradually gained attention in recent years. In particular, the Taiwan region has officially become an aging society; relevant public facilities should be gradually transformed and planned as soon as possible. In particular, the funeral facilities are the NIMBY facility. The three cities will face challenges about the use of funeral facilities including how to conduct cross-region cooperation with neighboring counties and cities, which presents an important issue in New Taipei City.

### **3. GENERAL SURVEY AND INTERREGIONAL SERVICE ANALYSIS OF FUNERAL FACILITIES IN NEW TAIPEI CITY**

#### **3.1 Background of New Taipei City**

New Taipei City is one of six municipalities in Taiwan with a population of almost 4 million. The population is highly concentrated in the administrative areas on the west side, such as Banqiao and Xinzhuang. In

the early days, it was a satellite city that developed on the periphery of Taipei City. Nowadays, due to the development of industry, commerce and urbanization, it has formed a multi-core urban form with Taipei City. Its whole area is surrounded by Taipei City, and the northeast area is surrounded Keelung City. Its north coast and northeast coast have rich seascape wonders and coastal scenery, and in the south, it sits at the edge of the Xueshan Mountain Range at the northern end of the Central Mountain Range. A major feature of the inland landscape of New Taipei City is more mountains and valleys. As New Taipei City has urbanized areas as well as mountains and valleys, and industrial and commercial development, it is not only popular for sightseeing, but also attracts many people who are working in the Taipei metropolitan area.

### 3.2 Analysis of the current situation regarding funeral facility use in New Taipei City

Based upon data of the New Taipei City government and this study, New Taipei City's funeral facilities include funeral parlors, public/private graveyards and columbarium buildings ([Table 1](#) and [Figure 1](#)). There are two funeral parlors in New Taipei City which are located in Banqiao and Sanxia districts. 198 public graveyards were built during the early development period of New Taipei City (before the Japanese colonial era). Approximately 54,878 graves are in use; the percentage of use is near 87% ([Figure 2](#)). Most districts' percentage of use has reached over 90%. The district with the lowest percentage of use is Wanli District at about 28%. Ruifang District, Pinglin District and Shiding District which are located on the city's east side have over 20 public graveyards each. Sanxia District and Xindian District located on the city's south side have 17 and 10 public graveyards respectively. Tamsui District and Sanzhi District located on the city's north side, have 12 and more than eight public graveyards respectively, while the number of public graveyards located in the sparsely populated administrative districts of New Taipei City accounts for more than 58%. In addition, some of the public graveyards are close to residential communities or downtown shopping districts, troubling the lives of the surrounding residents and hindering the development of the city. In recent years, the government has responded to the needs of residents by moving and greening the public graveyards to enable their use as other public facilities.

Furthermore, 30 private graveyards are located in New Taipei City (most graveyards having a columbarium building), with most located in Sanzhi District, Jinshan District and Shimen District, accounting for more than 30%. There are 18 public columbarium buildings in total, with 86,062 columbaria remaining vacant. The percentage of use is approximately 57%; the lowest percentages of use are 15% in Jinshan District, 22% in Sanxia District, 25% in Sanzhi District, and 28% in Pingxi and Shuangxi districts. Of New Taipei City's districts, ten districts have no columbarium facilities, resulting in residents needing to use facilities in other districts. Also, there are a total of 18 legal private columbarium buildings in New Taipei City, the most being in Sanzhi District which has four, and the second highest number being in Jinshan District which has three.

Table 1. Statistics of New Taipei City public/private cemetery and columbarium buildings

| District | Public graveyard | Public columbarium | Priva | Priva | Total |
|----------|------------------|--------------------|-------|-------|-------|
|----------|------------------|--------------------|-------|-------|-------|

|           |       |                            |              |                  |                   | building |                      |                  |                   | te    | te    |     |
|-----------|-------|----------------------------|--------------|------------------|-------------------|----------|----------------------|------------------|-------------------|-------|-------|-----|
|           |       |                            |              |                  |                   |          |                      |                  |                   | grave | colu  |     |
|           |       |                            |              |                  |                   |          |                      |                  |                   | yard  | mbari |     |
|           |       |                            |              |                  |                   |          |                      |                  |                   |       | um    |     |
|           |       |                            |              |                  |                   |          |                      |                  |                   |       | build |     |
|           |       |                            |              |                  |                   |          |                      |                  |                   |       | ing   |     |
|           | Place | Total land area (hectares) | Grave number | Remaining amount | Percentage of use | Place    | Column barium number | Remaining amount | Percentage of use | Place | Place |     |
| Bali      | 3     | 6.84                       | 4,135        | -                | 100%              | 1        | 13,532               | 6,032            | 55%               | 0     | 1     | 5   |
| Wugui     | 3     | 72.03                      | 86,876       | 16               | 100%              | 1        | 20,190               | 4,645            | 77%               | 2     | 0     | 6   |
| Linkou    | 3     | 10.78                      | 5,434        | 66               | 99%               | 0        | 0                    | 0                | 0                 | 1     | 1     | 5   |
| Shulin    | 6     | 22.75                      | 18,100       | 700              | 96%               | 1        | 7,714                | 5                | 100%              | 1     | 0     | 8   |
| Yingge    | 3     | 10.97                      | 12,630       | 341              | 97%               | 1        | 3,484                | 340              | 90%               | 0     | 0     | 4   |
| Sanxia    | 17    | 52.89                      | 62,176       | 1,413            | 98%               | 2        | 15,458               | 12,028           | 22%               | 2     | 2     | 23  |
| Xinzhuang | 1     | 16.31                      | 19,029       | 647              | 97%               | 1        | 22,741               | 7,956            | 65%               | 0     | 0     | 2   |
| Taishan   | 1     | 11.79                      | 14,731       | -                | 100%              | 0        | 0                    | 0                | 0                 | 0     | 0     | 1   |
| Tucheng   | 6     | 9.41                       | 9,265        | -                | 100%              | 1        | 7,646                | 530              | 93%               | 0     | 1     | 8   |
| Zhonghe   | 5     | 11.91                      | 11,333       | 855              | 92%               | 1        | 29,979               | 6,837            | 77%               | 1     | 0     | 7   |
| Xindian   | 10    | 34.46                      | 15,150       | 3,240            | 79%               | 2        | 19,010               | 7,946            | 58%               | 4     | 2     | 18  |
| Wulai     | 5     | 1.95                       | 2,765        | 269              | 90%               | 0        | 0                    | 0                | 0                 | 0     | 0     | 5   |
| Xizhi     | 10    | 28.44                      | 4,440        | 2,037            | 54%               | 0        | 0                    | 0                | 0                 | 0     | 0     | 10  |
| Jinshan   | 1     | 26.00                      | 14,000       | 245              | 98%               | 1        | 13,951               | 11,841           | 15%               | 4     | 3     | 9   |
| Tamsui    | 12    | 12.55                      | 8,313        | 390              | 95%               | 2        | 13,513               | 5,168            | 62%               | 1     | 0     | 15  |
| Wanli     | 4     | 5.27                       | 6,587        | 4,731            | 28%               | 1        | 3,437                | 1,400            | 59%               | 1     | 3     | 9   |
| Sanzhi    | 8     | 17.71                      | 12,388       | 3,010            | 76%               | 1        | 16,590               | 12,456           | 25%               | 5     | 4     | 18  |
| Shimen    | 2     | 5.39                       | 5,387        | 1,363            | 75%               | 0        | 0                    | 0                | 0                 | 2     | 1     | 5   |
| Shenkeng  | 8     | 10.45                      | 5,302        | -                | 100%              | 0        | 0                    | 0                | 0                 | 2     | 0     | 10  |
| Pingxi    | 5     | 14.34                      | 17,929       | 5,762            | 68%               | 1        | 8,386                | 6,062            | 28%               | 0     | 0     | 6   |
| Ruifang   | 23    | 59.89                      | 21,258       | 2,401            | 89%               | 0        | 0                    | 0                | 0                 | 3     | 0     | 26  |
| Gongliao  | 13    | 61.53                      | 44,450       | 20,041           | 55%               | 0        | 0                    | 0                | 0                 | 0     | 0     | 13  |
| Pinglin   | 21    | 23.70                      | 5,195        | 2,314            | 55%               | 0        | 0                    | 0                | 0                 | 0     | 0     | 21  |
| Shuangxi  | 8     | 15.42                      | 19,590       | 4,926            | 75%               | 1        | 3,900                | 2,816            | 28%               | 0     | 0     | 9   |
| Shiding   | 20    | 15.50                      | 2,100        | 110              | 95%               | 0        | 0                    | 0                | 0                 | 1     | 0     | 21  |
| Total     | 198   | 558.28                     | 428,563      | 54,878           | 87%               | 18       | 199,531              | 86,062           | 57%               | 30    | 18    | 264 |



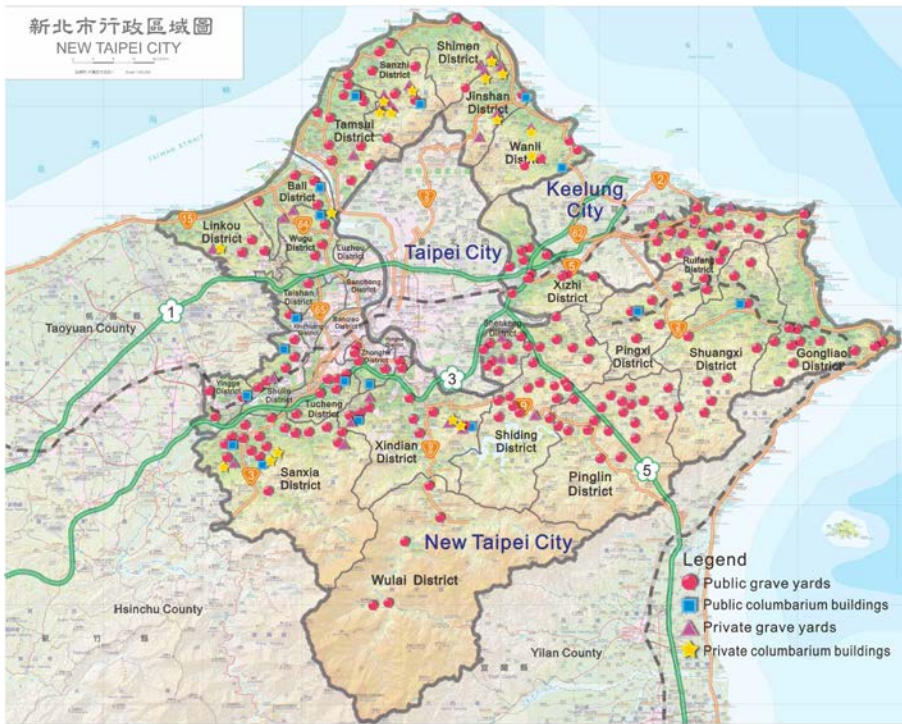


Figure 1. Schematic diagram of the distribution of public graveyards and columbarium buildings in each administrative district of New Taipei City

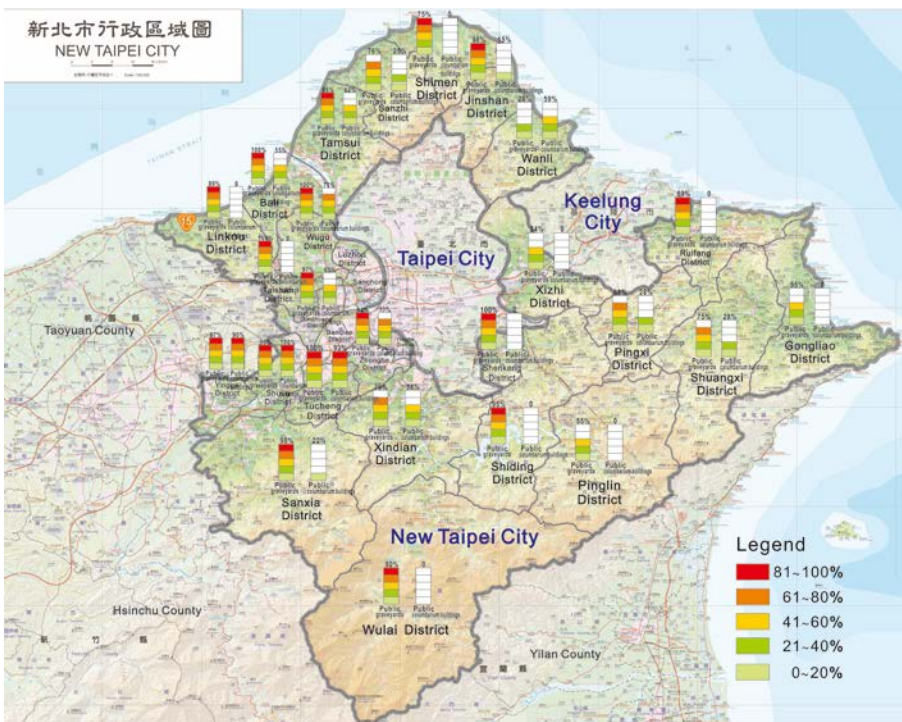


Figure 2. Schematic diagram of the percentage of use of public graveyards and columbarium buildings in each administrative district of New Taipei City



### **3.3 Analyse the cross-regional service range of funeral facilities in New Taipei City**

#### **3.3.1 Analysis of service range of funeral facilities**

Public graveyards and columbarium buildings are mainly characterized by a services range between 10 to 25 km. As the result of the public graveyards in the center of Taipei City having a radius of 15-20 km (Ministry of the Interior, 1986), this study uses "15 km" as the hypothetical value of the service radius of "public graveyards" and "public columbarium buildings" in New Taipei City. Although there is no literature showing the service radius or distance between the funeral parlor and the cremation field, according to the customs and culture in Taiwan, the cremation field and funeral parlors are places where family members can practice worship and cremate the dead, and then take the ashes of the dead to a cemetery. The three cities have formed a community, so this study uses "25 km" as the hypothetical value of service areas for funeral parlors and cremation fields in the three cities to understand its service coverage range, and to present the potential issues of cross-regional service and the regional cooperation of funeral facilities.

After drawing the service range of funeral facilities, the funeral parlor and cremation field of New Taipei City are located in Banqiao and Sanxia district. It makes inconvenient for citizens who live in northern districts (eg. Sanzhi and Shimen), eastern districts (e.g. Gongliao and Shuangxi), and southern and south-eastern districts (e.g. Shiding and Shenkeng), which forces residents who live in Bali, Linkou, Tamsui, Sanzhi, Jinshan, southern Gongliao, southern Shuangxi, southern Pinglin and southern Wulai to apply cross-regionally to use funeral facilities in Taipei City or Keelung City. Although the existing public graveyard service range covers all administrative districts, with a partial cover of Taipei City and Keelung City, after further examining the overlap in service range, it is evident that there is differential regional service coverage; the most overlap is found in eastern New Taipei City. On the other hand, the overlap is relatively low on the west side of New Taipei City ([Figure 3](#)). Similarly, the existing service range of columbarium buildings is also due to the difference in quantity and distribution, resulting in the highest overlap of service coverage on the west side of New Taipei City. On the other hand, some of the administrative districts such as Pinglin, Shiqian and Wulai have no columbarium buildings in the district or the surrounding administrative districts, resulting in the inability to use columbarium buildings, and as a result residents must use the funeral facilities in different regions ([Figure 4](#)). The results also show that the distribution of funeral facilities in New Taipei City is uneven or unreasonable.

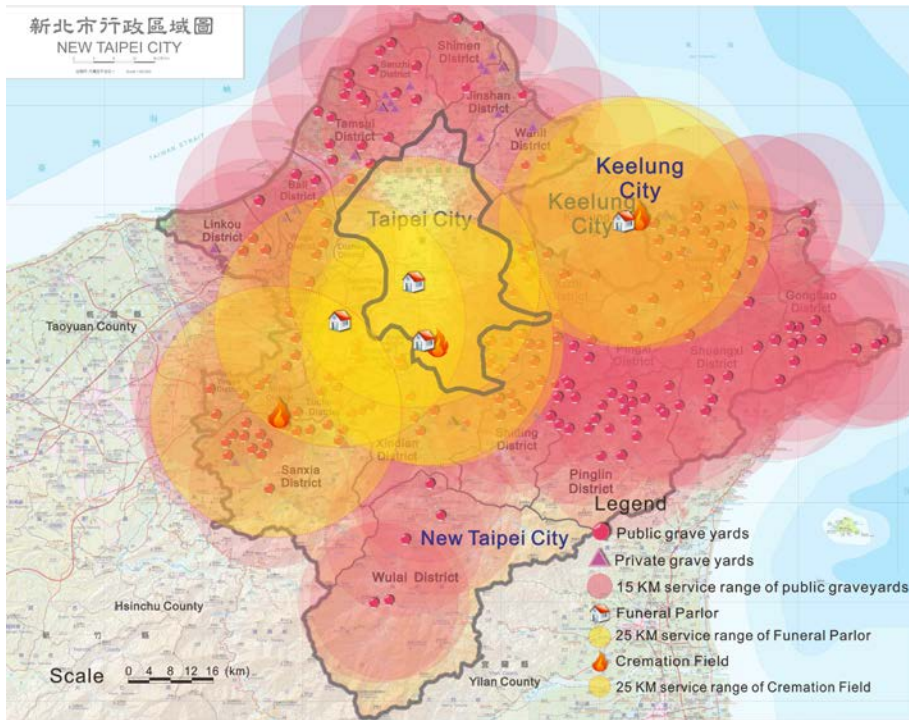


Figure 3. Schematic diagram of the 25 km service range of funeral parlors and cremation field in the three cities, and the 15 km service range of public graveyards in New Taipei City

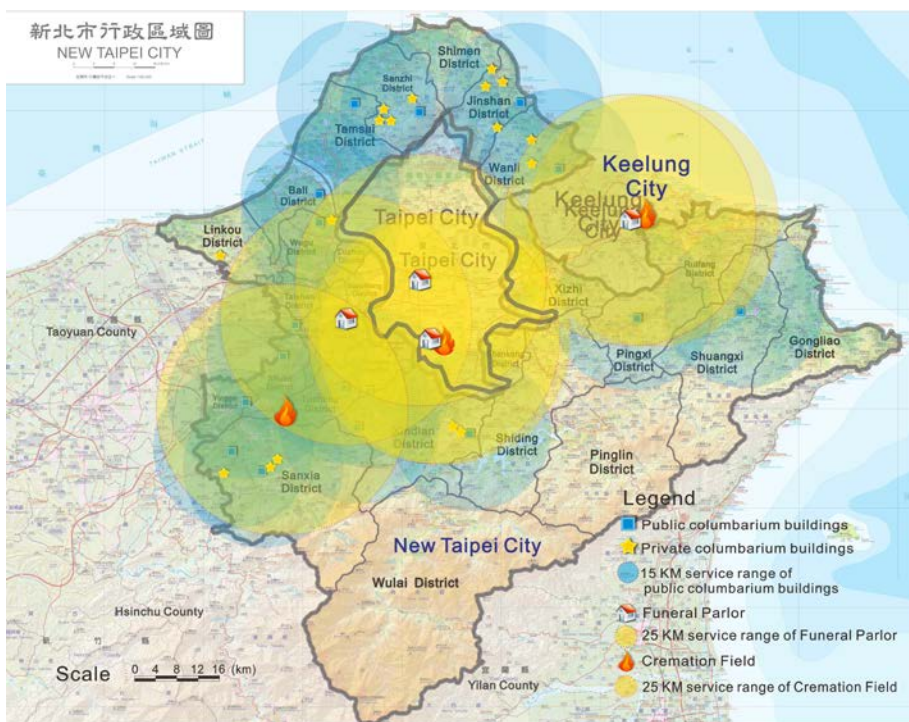


Figure 4. Schematic diagram of the 25 km service range of funeral parlors and cremation fields in the three cities, and the 15 km service range of public columbarium buildings in New Taipei City

### 3.3.2 Cross-regional Use of Funeral Facilities

Due to the dense population in Taiwan, the percentage of cremations has now reached more than 90% due to government incentivization. This study is based on the statistical analysis of the use of some of the columbaria in New Taipei City (some of the columbarium buildings have not been opened for public applications because of special reasons). The results show ([Table 2](#)) that although the residents of the administrative district where the columbarium building is located apply for use, the percentage of use in some administrative districts is less than 50%, including in Pingxi, Zhonghe, Wugu, Bali and Xinzhuang; some districts have more than 50% cross-regional usages, such as Bali and Wugu. According to the statistics, users who apply to use the columbaria also include residents of Taipei City and Keelung City, or residents of other counties and cities. This is partly due to the fact that in a few districts of New Taipei City there are no columbarium buildings available to service residents, so they must apply to cross-regional services (eg. the districts of Sanchong, Luzhou, Banqiao and Taishan have no columbarium building, so the residents must apply to the districts of Bali or Wugu). Other reasons may be due to personal considerations such as ideal funeral facilities, geographical relationships, convenient transportation, or Feng Shui. This shows that funeral facilities in New Taipei City have provided allowances for local districts' residents to apply as well as those from other counties and cities.

Table 2. Statistics on the use of public columbarium buildings in New Taipei City

| District             |              | Xinzhuan | Bali  | Wugu  | Sanzhi | Wanli | Shenke | Zhonghe | Sanxia | Shulin | Xindian | Pingxi | Shuangxi |
|----------------------|--------------|----------|-------|-------|--------|-------|--------|---------|--------|--------|---------|--------|----------|
| Total Usage amount   |              | 7,509    | 1,648 | 4,018 | 2,000  | 386   | 1,388  | 7,341   | 769    | 2,595  | 2,945   | 1,005  | 932      |
| Each district        | Usage amount | 3,592    | 211   | 867   | 1,116  | 284   | 1,324  | 3,507   | 501    | 1,576  | 2,371   | 378    | 614      |
|                      | Percentage   | 48%      | 13%   | 22%   | 56%    | 74%   | 95%    | 48%     | 65%    | 61%    | 81%     | 38%    | 66%      |
| Other district       | Usage amount | 2,725    | 1,093 | 2,271 | 637    | 30    | 28     | 2,834   | 222    | 604    | 357     | 495    | 261      |
|                      | Percentage   | 36%      | 66%   | 57%   | 32%    | 8%    | 2%     | 39%     | 29%    | 23%    | 12%     | 49%    | 28%      |
| Taipei City          | Usage amount | 396      | 199   | 493   | 84     | 48    | 27     | 427     | 26     | 147    | 167     | 83     | 19       |
|                      | Percentage   | 5%       | 12%   | 12%   | 4%     | 12%   | 2%     | 6%      | 3%     | 6%     | 6%      | 8%     | 2%       |
| Keelung City         | Usage amount | 15       | 12    | 9     | 2      | 20    | 1      | 38      | 0      | 0      | 4       | 30     | 22       |
|                      | Percentage   | 0%       | 1%    | 0%    | 0%     | 5%    | 0%     | 1%      | 0%     | 0%     | 0%      | 3%     | 2%       |
| Other county or city | Usage amount | 781      | 133   | 378   | 162    | 4     | 8      | 535     | 20     | 268    | 46      | 19     | 16       |
|                      | Percentage   | 10%      | 8%    | 9%    | 8%     | 1%    | 1%     | 7%      | 3%     | 10%    | 2%      | 2%     | 2%       |

## **4. ANALYSIS OF TOTAL SUPPLY AND USE DEMAND OF FUNERAL FACILITIES IN TAIPEI METROPOLITAN AREA**

### **4.1 Estimated total demand for use in the three cities**

This study is based on a time series model to understand the total demand for the future use of public graveyards and columbarium facilities in the three cities. The average growth rate and death rate of the three cities over the years is established, the gross population and gross death toll until 2025 are estimated, the total death toll from 2015 to 2025 is surmised, and finally the number of people using funeral facilities in the future is estimated. In addition, people in recent years have gradually accepted sea burials or environmental burial; based on the statistics of Taipei City in 2012, the number of burials was approximately 10% of the total number of deaths, assuming therefore that the total number of deceased who chose to use a public graveyard or columbarium facility was 90% of the total number of deaths. Similarly, it is found that according to statistics from the Ministry of the Interior in 2013, the percentage of use of public graveyards and columbarium facilities is separately about 10% and 90% respectively. Further, the total demand for the use of funeral facilities in the three cities should be estimated to understand the existing supply of funeral facilities and inform cross-regional strategies.

#### **4.1.1 Analysis of demand for funeral facilities in New Taipei City**

Although the vast land of New Taipei City and some of its districts are similar with regard to geographical locations, referring to the New Taipei City Government Funeral Facilities Service Zoning Plan, this study divides the 29 administrative districts of New Taipei City into six major service zones for funeral facilities: zone 1 includes Tamsui, Sanzhi and Shimen, zone 2 includes Xizhi, Jinshan and Wanli, zone 3 includes Ruifang, Gongliao, Pingxi and Shuangxi, zone 4 includes Xindian, Shenkeng, Shiding, Pinglin and Wulai, zone 5 includes Xinzhuang, Sanchong, Luzhou, Taishan, Wugu, Linkou and Bali, and zone 6 includes Banqiao, Zhonghe, Yonghe, Tucheng, Shulin, Yingge and Sanxia, as a basis for estimating the supply and demand of funeral facilities in each district. According to statistics as of the end of 2014, the highest death toll in New Taipei City was in Zone 4 (about 9,998 people) and the lowest death toll was in Zone 3 (about 781 people). Moreover, adding the estimated death toll from 2015 to 2025, Zone 6 had 109,169 deaths, and as a result, may be the most demanding area for funeral facilities in New Taipei City. Using estimation, the demand for public graves and columbarium facilities are 9,825 and 88,425 respectively. The reason is that Banqiao, Zhonghe, Yonghe, Tucheng, Shulin, Yingge and Sanxia are the most densely populated areas in New Taipei City ([Table 3](#)).

Table 3. Estimation of the number of people using public graveyards and columbarium buildings across six major service zones in New Taipei City

| Items  | Zone 1  | Zone 2  | Zone 3 | Zone 4  | Zone 5    | Zone 6    |
|--|---------|---------|--------|---------|-----------|-----------|
| Gross population (person), 2014  | 195,790 | 240,051 | 68,473 | 343,724 | 1,296,825 | 1,820,786 |
| Gross death toll (person), 2014  | 1,157   | 1,436   | 781    | 2,239   | 6,324     | 9,998     |
| The crude death rate, 2014   | 0.59%   | 0.60%   | 1.14%  | 0.65%   | 0.49%     | 0.55%     |
| Estimated gross death toll (person), 2015-2025   | 14,573  | 16,133  | 8,061  | 24,951  | 72,153    | 109,167   |
| Estimated total number of people using public graveyard or columbarium building (person) | 13,115  | 14,520  | 7,255  | 22,456  | 64,938    | 98,250    |
| Number of people using public graveyards (occupy 10%)                                    | 1,312   | 1,452   | 726    | 2,246   | 6,494     | 9,825     |
| Number of people using public columbarium buildings (occupy 90%)                         | 11,804  | 13,068  | 6,530  | 20,210  | 58,444    | 88,425    |

#### 4.1.2 Analyzing the demand for funeral facilities in the three cities

At the end of 2014, the highest death toll was in New Taipei City (about 21,857 people), its death rate about 0.55%. Keelung City had the highest death rate of the three cities, its death rate about 0.76%. After adding the death toll from 2015 to 2025, the numbers of new users of funeral facilities from this period are estimated to be 224,650 in New Taipei City, 172,634 in Taipei City and 27,184 in Keelung City. Use of public graveyards and public columbarium facilities are, respectively, 22,465 and 202,185 in New Taipei City, 17,263 and 155,371 in Taipei City, and 2,718 and 24,465 in Keelung City ([Table 4](#)).

Table 4. Estimation of the number of people using public graveyards and columbarium buildings in the three cities

| Items  | New Taipei City | Taipei City | Keelung City |
|--|-----------------|-------------|--------------|
| Gross population (person), 2014  | 3,966,818       | 2,702,315   | 373,077      |
| Gross death toll (person), 2014  | 21,857          | 17,030      | 2,854        |
| The crude death rate, 2014   | 0.55%           | 0.63%       | 0.76%        |
| Estimated gross death toll (person), 2015-2025   | 249,611         | 191,816     | 30,204       |
| Estimated total number of people using public graveyard or columbarium building (person) | 224,650         | 172,634     | 27,184       |
| Number of people using public graveyards (occupy 10%)                                    | 22,465          | 17,263      | 2,718        |
| Number of people using public columbarium buildings (occupy 90%)                         | 202,185         | 155,371     | 24,465       |

## 4.2 Estimated future supply and demand of funeral facilities in the three cities

### 4.2.1 Analysis of funeral facility inventories in service zones of New Taipei City, and future supply and demand

According to the existing use of public graveyards and columbarium facilities across the six major service zones in New Taipei City in 2014 ([Table 5](#)), the lowest use rate is almost 70%, and the Zone 5 and the Zone 6 usage has approached saturation. The columbarium facilities show a great difference in the use rate due to geographical location. The use rate in Zone



2 and the Zone 3 is less than 30%, in contrast, the use rate in Zone 4, Zone 5 and the Zone 6 is about 50% to 60%, these being the three zones which are the most densely populated districts in the Taipei metropolitan area. In addition, this study further explores a comparison between the total demand for public graveyards and the public columbarium facilities in 2025 and the inventory of facilities in 2015. The inventory of graves and columbarium in Zone 1, Zone 2 and Zone 3 is still sufficient, but shortages are anticipated in Zone 4, Zone 5 and Zone 6. The largest shortage is expected in Zone 6 (about 6,516 graves and 68,685 columbariums). Under the Environmental Funeral Policy and increasing cremation rates, a serious shortage of columbarium facilities will result in low efficiency of public services in service zones. Through necessary cross-region cooperation and deployment, the problems of shortage and uneven distribution in New Taipei City could be improved.

Table 5. Total estimates of future supply and demand for funeral facilities across six service areas in New Taipei City

| Service Areas | Items                        | Maximum capacity (A) | The number of graves and columbarium were used, 2014(B) | Percentage of Use | Estimate total demand for graves and columbarium until 2025 (C) | Estimated graves and columbarium remaining until 2025 (A-B-C) |
|---------------|------------------------------|----------------------|---|-------------------|---|---|
| Zone 1        | Available graves             | 26,088               | 21,325  | 82%               | 1,312   | 3,451   |
|               | Available public columbarium | 30,103               | 12,479  | 41%               | 11,804  | 5,820   |
| Zone 2        | Available graves             | 25,027               | 18,014  | 72%               | 1,452   | 5,561   |
|               | Available public columbarium | 17,388               | 4,147   | 24%               | 13,068  | 173   |
| Zone 3        | Available graves             | 103,227              | 70,097  | 68%               | 726   | 32,405  |
|               | Available public columbarium | 12,286               | 3,408   | 28%               | 6,530   | 2,348   |
| Zone 4        | Available graves             | 30,512               | 24,579  | 81%               | 2,246   | 3,687   |
|               | Available public columbarium | 19,010               | 11,064  | 58%               | 20,210  | -12,264   |
| Zone 5        | Available graves             | 130,205              | 129,476   | 99%               | 6,494   | -5,765  |
|               | Available public columbarium | 56,463               | 37,830  | 67%               | 58,444  | -39,811   |
| Zone 6        | Available graves             | 113,504              | 110,194   | 97%               | 9,825   | -6,516  |
|               | Available public columbarium | 64,281               | 44,541  | 69%               | 88,425  | -68,685   |

Note: According to the regulations in Taiwan, each grave shall not exceed 8m<sup>2</sup>. This study assumes as a hypothetical value (8m<sup>2</sup>/person) to estimate the requirement of grave area, which is the number of graves×8m<sup>2</sup>= required grave area.

#### 4.2.2 Analysis of the inventory and future supply and demand of funeral facilities in the three cities

The results show (Table 6) that after deducting the number of public graves and columbaria in use at the end of 2014, New Taipei City also has the largest inventory number among the three cities. The study further deducts the estimated total demand for public graves and columbaria in 2025 from the total inventory number of public funeral facilities in the three

cities, and has found that although the inventory of public graves and columbaria in the three cities can meet the needs of each city, the inventory of remaining public columbarium is only 17,074 in Taipei City, and therefore gradually approaching saturation. In contrast, the inventory of public columbaria in New Taipei City is approximately 1,300,000, highlighting the need for cross-region cooperation among governments to seek opportunities for possible cooperation and to avoid a lack of funeral facilities and citizen complaints.

Table 6. The total estimate of future supply and demand for funeral facilities in the three cities

| County/City     | Items                       | Maximum capacity (A) | Number of graves and columbaria in use, 2014(B) | Percentage of Use | Estimate total demand for graves and columbaria until 2025 (C) | Estimated graves and columbaria remaining until 2025 (A-B-C) |
|-----------------|-----------------------------|----------------------|---|-------------------|--|--|
| New Taipei City | Available graves            | 837.79               | 423.42  | 75%               | 17.97  | 396.40   |
|                 | Available public columbaria | 1,856,199            | 384,267   | 21%               | 202,185  | 1,269,747  |
|                 | Available graves            | 302.75               | 48.04   | 16%               | 13.81  | 240.90   |
| Taipei City     | Available public columbaria | 362,860              | 190,415   | 52%               | 155,371  | 17,074   |
|                 | Available graves            | 120.00               | 4.25  | 4%                | 2.17   | 113.58   |
| Keelung City    | Available public columbaria | 201,165              | 30,258  | 15%               | 24,465   | 146,442  |

Note: According to the regulations in Taiwan, each grave shall not exceed 8m<sup>2</sup>. This study assumes as a hypothetical value (8m<sup>2</sup>/person) to estimate the requirement of grave area, which is the number of graves×8m<sup>2</sup>= required grave area.

## 5. DISCUSSION

### 5.1 Discussion on the demand issues and regional cooperation of funeral facilities in New Taipei City

#### 5.1.1 Uneven use of funeral facilities causing the imbalance in New Taipei City

Statistics from [Table 1](#) show the densely populated administrative districts reflect a high use rate of public funeral facilities. The population is less than the densely populated districts, such as Wanli with a use rate of only 28%, and Jinshan, Sanzhi, Pingxi and Shuangxi at approximately 25%. The result shows a potential regional management problem facing public funeral facilities. To remedy the problems of funeral facilities being often unable to be used or built due to resistance by residents, governments should develop strategies for citizens early, so that they may initiate cross-district use to avoid complaints due to improper management of the funeral facilities or inadequate facilities.

### 5.1.2 Properly deploy management, planning and use to develop sustainable strategies for the funeral facilities in New Taipei City

[Table 2](#) shows that the use rate of public columbarium facilities by local residents in some administrative districts is lower than that of residents from other counties/cities or districts. [Table 5](#) and [Table 6](#) show the supply of public graveyards and columbarium facilities could meet the demand in New Taipei City. However, if the governments of the three cities maintain the current use status, it is estimated that the funeral facilities in densely populated areas in 2025 will face serious shortages (such as in Xinzhuang Sanchong, Luzhou, Taishan and Banqiao). The government of New Taipei City should, through the use of facilities planning, management and deployment, develop strategies to reach the goal of sustainable use in New Taipei City (such as improve transportation to and convenience of remote public columbarium facilities, or discounted prices to attract families and other users).

### 5.1.3 Cross-region use and regional cooperation of funeral facilities in New Taipei City

The results of this study show that the public funeral facilities in New Taipei City are distributed unevenly and insufficiently. This has caused citizens to apply for public funeral facilities cross-regionally, eg. Sanchong, Banqiao and Shenkeng. From [Table 2](#) it can be seen that public funeral facilities do have characteristics of cross-regional use. In addition, except for residents of the administrative districts close to the cremation field in Sanxia and the funeral parlor in Banqiao, residents who live in other districts (such as Gongliao, Shuangxi, Jinshan, Wanli, Shimen and Sanzhi) are likely to choose a public funeral parlor or public cremation field in Taipei City or Keelung City nearby due to time, distance and traditional customs considerations ([Figure 3](#) and [Figure 4](#)). Similarly, residents who live in Taipei City and Keelung City are likely to choose a public funeral parlor or public cremation field in New Taipei City's districts nearby, such as Xizhi, Jinshan, Sanzhi, Tamsui or Xindian. Facing the limited land resources and the difficulty in setting up public funeral facilities in the Taipei Metropolitan Area, a regional cooperation mechanism for public funeral facilities should be started as soon as possible in the three cities, to consider fees, usage, and so on.

## 5.2 Use of funeral facilities in New Taipei City and planning strategies for regional cooperation

Due to the existing public cemeteries and columbarium facilities being old and the lack of planning in New Taipei City, there is a shortage of these. An additional factor is that new funeral facilities are difficult to build because of resistance from residents. According to the literature, the principle of regional cooperation, equality and reciprocity, and public-private partnerships, can be used to review and improve existing funeral facilities in New Taipei City and to discuss cooperation with the administrative agencies of Taipei and Keelung, as well as to work with the private sector to establish partnerships to solve the problems of funeral facilities. Therefore, this study suggests that the New Taipei City Government could make policies at four levels: regional planning, facility

upgrades, management system and regional cooperation levels (*Figure 5*), and also develop nine strategies for public funeral facilities using regional cooperation, as follows:

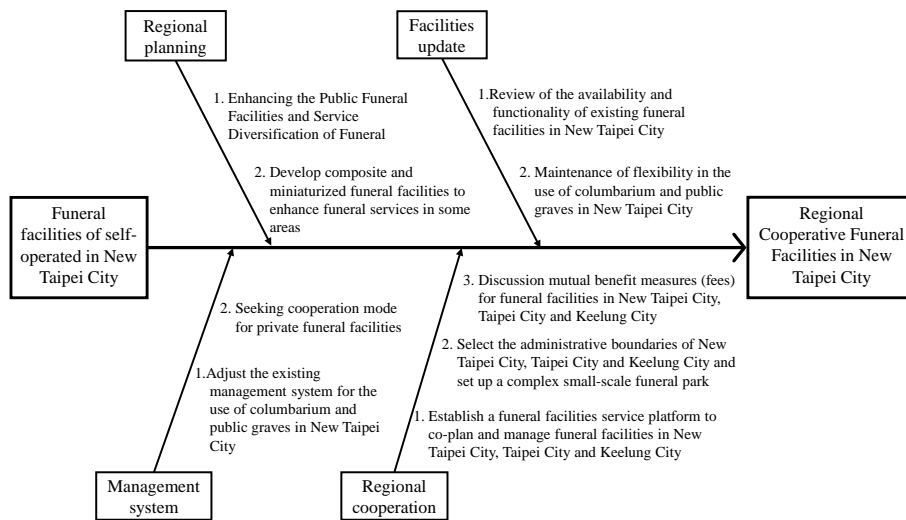


Figure 5. Schematic diagram of a cooperation strategy for public funeral facilities in New Taipei City

## 5.2.1 Regional planning

### 5.2.1.1 Enhancing public funeral facilities and service diversification of funeral facilities in densely populated areas

Due to the rate of use of cremation and columbarium facilities having reached over 90% in Taiwan, it is suggested to select some of the public graveyards in densely populated areas to construct a park with columbarium facilities, along with adding leisure places, pools, landscaped areas, parking lots, and so on (*Figure 6*). In addition to improving the insufficiency of columbarium facilities, the graveyards could also be given a new look to enhance the quality of local public facilities.



Figure 6. Schematic diagram of the renovation of the public graveyards in Xinzhuang District of New Taipei City

### **5.2.1.2 Develop composite and miniaturized funeral facilities to enhance funeral services in some areas**

For a family living in Sanzhi, Shimen, Jinshan, Tamsui, or a similar area, a distance of about 40 minutes to an hour is needed to reach a funeral parlor or a cremation field in a single trip ([Figure 3](#)). It is necessary to establish new funeral parlors or cremation fields, but they are NIMBY facilities which have a greater impact on the social atmosphere and the environment, so this is often inhibited. Therefore, some districts have chosen for public graveyards to add some complex, miniaturized or moveable facilities for residents to apply for and use, including multi-functional planning concepts, reducing the environmental impact and enhancing the function of regional funeral services.

## **5.2.2 Facility upgrades**

### **5.2.2.1 Review of the availability and functionality of existing funeral facilities in New Taipei City**

The existing public graveyards during most of the Japanese occupation period in New Taipei City were located in densely populated areas and lacked proper management of the graveyard environment. The graves lack proper planning, resulting in people not wanting to get close to the area, and also leading to limited development of the city. Some public graveyards are located in deep mountain jungles with sparse population and inaccessible locations. Residents have been unable to apply for and use these facilities in recent years, therefore it is suggested to ban burial and relocation at these sites, and also to move a public columbarium building which has a low use rate, and following relocation the land could be used for other urban public facilities or afforestation, and relocation would also improve the idleness of some of the public columbarium buildings.

### **5.2.2.2 Maintenance of flexibility in the use of columbaria and public graves in New Taipei City**

From [Table 5](#) and [Table 6](#), it can be seen that some public graveyards' service areas will face a problem of columbaria and grave shortages. In 2025, it is estimated there will be less than 20,000 columbaria in Taipei City. This study suggests the New Taipei City government should start with existing public columbaria located in Zone 4, Zone 5 and Zone 6, that have for a long time not been visited by relatives or friends, to be required for relocation (such as those located in Pingxi, Shuangxi or Sanzhi). Through an internal deployment method in the New Taipei City area, some graves will be vacant each year, enabling management flexibility of the funeral facilities by the government. Also, this will increase the opportunities for regional cooperation with Taipei City.

## **5.2.3 Management system**

### **5.2.3.1 Adjust the existing management system for the use of columbaria and public graves in New Taipei City**

Relevant laws and regulations stipulate that the use of public graveyard graves is for six years, but there is no limitation of years for columbaria and it requires a one-time charge. The payment method is different with the private graveyards and columbarium buildings, and it also does not comply with the principle of user payment. Therefore, this study suggests to review the existing charge method for columbaria and graves, include comparing



with private funeral facilities to charge annual maintenance and management fees. It could increase the financial revenue of government, improve the quality of public facilities and the environment, control the quantity and quality of public funeral facilities, and adjust the use of funeral facilities within the jurisdiction at any time based on rolling management.

#### **5.2.3.2 Seeking cooperation with private funeral facilities**

The Public-Private Partnership (PPP) is a popular financial model for government infrastructure construction and providing public services ([Guo, 2017](#)). According to statistics of the New Taipei City Government, some of the private columbaria are less than 50% in use. If a cooperative mode could be reached with private funeral facilities, eg. to rent some private columbaria and formulate user and use rights agreements for purpose, this could provide residents of the local and nearby areas with the opportunity to apply for and use these facilities. Therefore, it not only increases the flexibility of the management of public funeral facilities, but also increases the use rate of private funeral facilities and increases the financial income, thereby achieving a win-win situation between the private company, the citizens and the government.

#### **5.2.3.3 Establish a funeral facilities' service platform to co-plan and manage funeral facilities across the three cities**

Although the three cities all face the problem of insufficient use of funeral facilities, residents of the three cities have been applying for and using the public funeral facilities cross-regionally for a long period. However, due to the administrative powers and responsibilities of administrative jurisdictions, this usually leads to problems of local government self-centeredness and directly affects citizens' applications and use rights. Therefore, this study suggests that the three cities can establish a funeral facilities service platform for New Taipei City, Taipei City and Keelung City, to have regularly organized conferences and to suggest unified contact units. Not only for the convenience of applications or inquiries from residents in various districts, but also the platform could be used for planning, management and to support and achieve the purpose of equality and mutual benefit.

### **5.2.4 Regional cooperation**

#### **5.2.4.1 Select the administrative boundaries of the three cities and set up a complex small-scale funeral park**

In order to balance the needs of different funeral facilities in the three cities, the principle of equal benefits of funeral facilities, the convenience of applications for the nearby residents of the three cities, as while as reducing the residents' resistance to traditional funeral parlor or cremation facilities. This study suggests that based on the idea of regional cooperation, a public graveyard located in New Taipei City, and also nearby Taipei City and Keelung City, should be selected to reconstruct as a complex, a small funeral park (for example, the public graveyards of Xizhi in New Taipei City), combining the land of New Taipei City with funds from Taipei City and Keelung City. A new public graveyards component would include a management center, a columbarium building, a ceremony hall, a cremation facility, a parking lot and landscaping ([Figure 7](#)); it would be not only convenient for the residents of the three cities to apply nearby, but also

would improve the service efficiency of the funeral facilities in the three cities.

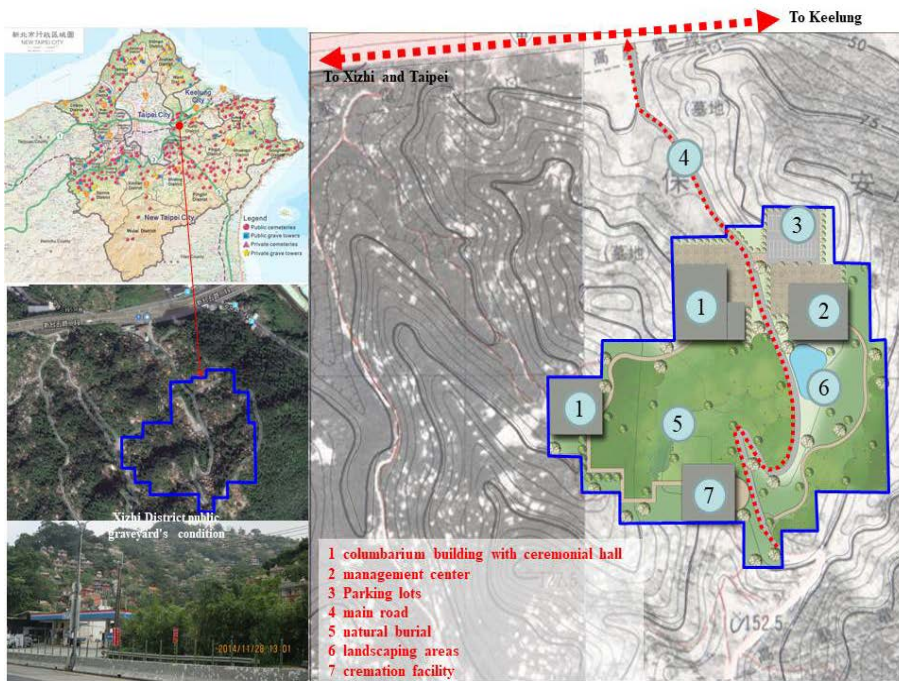


Figure 7. Schematic diagram of the reconstruction of the public graveyards of Xizhi in New Taipei City as a complex funeral park

#### 5.2.4.2 Discussion of mutual benefit measures (fees) for funeral facilities in the three cities

Residents of the three cities have been used to using facilities cross-regionally for a long time, such as the residents of Jinshan, Sanzhi, Pingxi, Shuangxi, Gongliao, Ruifang and Tamsui, where residents usually use cross-region funeral parlors and cremation facilities in Taipei City or Keelung City. However, they are not citizens in either of the two cities so their payment is often double or triple that of a local citizen's fee. Based on regional cooperation, the three cities should agree to reduce costs or have equal use of mutual benefits (such as exemption of cross-cities' usage fees), eg. the charge for citizens of Taipei City and Keelung City should be equal to that of the citizens of New Taipei City. In this way, the citizens of the three cities will benefit from the application and use of the facility, reducing the financial burden on the family of the deceased, and also is an opportunity for the regional cooperative funeral facilities.

## 6. CONCLUSION AND RECOMMENDATION

### 6.1 Conclusion

Due to the trend of globalization, inter-city exchanges and competition have become increasingly frequent. In 2006, the three cities began to set up regional cooperation platforms and started to engage in leisure recreation, transportation, industrial development, disaster prevention and rescue,

garbage disposal and public facilities issues. Although regional cooperation has been implemented for many years, it still has some shortcomings, including administrative systems, self-centeredness and horizontal communication. However, the three governments must face the issues regarding how to effectively integrate and allocate resources, especially as Taiwan has become an aging society; with the trend of the aging social population, regional cooperation regarding funeral facilities in the three cities is more necessary and urgent. According to the research results, the service range of the funeral facilities in the three cities should have complementary functions of supply and demand, and citizens' cross-regional use of funeral facilities further proves the necessity of cooperation among the funeral facilities across the three cities.

In light of the NIMBY characteristics of funeral facilities, the resistance of the residents and the social atmosphere, it is difficult to construct new funeral facilities. As a result, the three cities should utilize a regional cooperation model to achieve mutual benefits regarding funeral issues. This study suggests that the problems of regional cooperation in New Taipei City can be addressed from the four aspects of regional planning, facility upgrades, management systems, and regional collaboration. From the four aspects nine strategies can be developed, including a review of the existing location and function of funeral facilities in New Taipei City, strengthening the existing funeral facilities' service functions and use percentage in New Taipei City, maintaining flexible use of funeral facilities, seeking cooperation modes for private funeral facilities and discussion of mutual benefit measures (fees) for funeral facilities in New Taipei City, Taipei City and Keelung City, and so on. The suggestions should be referred to in a follow-up plan of New Taipei City's government on related actions and regional cooperation issues.

## **6.2 Recommendations**

The following studies are suggested for future research:

1. To survey family members of the deceased from the viewpoint of using funeral facilities and the intention of choosing cross-region funeral facilities, as well as to explore the options for regional cooperation of the local government's funeral department. The result would be the identification of short-medium-long term strategies for cross-regional cooperation.
2. To establish regional cooperation with hardware and software in funeral facilities, utilizing a mutual benefit model, and to provide the details of local government discussions of regional cooperation, such as the set fees of funeral facilities.
3. To explore the relationship of factors, such as the use of funeral facilities relative to transportation, interests and other public facilities (such as hospitals, nursing homes, etc.).

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