The Ideal and Practical Pattern of Positioning Police Stations in Qazvin City and its Comparison with the Present Condition

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Abstract

Finding an appropriate place for a police station is influenced by different parameters like crime-prone areas, distance from main roads, distance from police stations, etc. Since finding a location requires a lot of information, a large quantity of detailed information for introducing different places should be collected and analyzed to conduct a correct evaluation of factors influencing the choice. In this article, by collecting exact information from sources and police stations using documentary methods and their analysis, key factors and parameters in this topic are achieved and represented. Also, practically concentration of Qazvin province police stations and their present locations were compared with achieved ideal indicators. The last step in spatial modeling is to use the output by applying these achievements, establishment of a new police station is proposed. According to the results of this research, appropriate positioning can be proposed after a step-by-step process, so that, in addition to observing principles and regulations we have increasing efficiency and quality.

Keywords: positioning, indicators, data management, fitness model, critical area, information layers

Introduction

Finding appropriate place for a police area in which various parameters such as crime-prone area, distance from the main road, distance from the security stations etc. with different influencing weights are considered is one of the difficult key factors in these issues.

Since positioning requires a lot of information, large corpus of detailed data should be collected and analyzed to represent different locations, in order to properly evaluate the factors that may influence the choice made.

The proposed model consists of 6 steps to choose an optimized location or site in which performing each of these steps properly, at the end we can chose a good place for any activity with high reliability, but the main emphasis on the choice of location is for Police units. Steps taken to choose the appropriate site have been proposed below. The purpose of this model is to find the optimal sites. A suitable model may discover good places for police station.

Finding an appropriate place for a police station with different effective parameters such as crime-prone form, distance from main roads, distance from police stations etc. with different weights in finding them is called positioning. Since positioning requires a lot of information, a large amount of detailed information for introducing different places should be collected and analyzed to make proper evaluation from factors that may affect the choice (Karimi, 2003:9).

Definition of key terms

Zoning : Zoning has a lot of use in planning especially in macro-planning. By zoning we mean finding homogenized areas or zones with regard to one or several common features or characteristics. In addition, zoning scale is a macro-scale that is usually used for zoning at

provincial, national or even transnational level. Among important uses of this term, we can refer to the security, defense and threats, including natural and abnormal threats. Besides, in police we can pay attention to security zoning for the security and defense before any action based on a series of parameters such as: security level of different areas of the country.

Positioning: Choosing an appropriate place for establishment of an application place that can be synchronized with certain needs of the relevant application or finding a suitable place for a police station in the way that different parameters such as crime-prone area, distance from main roads, distance from police centers etc. with different weights that influences finding them is called positioning. Since positioning requires a lot of data, a large amount of detailed data for introducing different places should be collected and analyzed to make proper evaluation from factors that may affect the choice. Positioning is a process through which the best place for an activity can be determined based on the predetermined conditions regarding available resources and facilities. In fact, positioning is spatial analysis of data and descriptive data to find one or more spatial position with descriptive features considered by the user. In general, positioning is done either by choosing sample points and mathematical statistical processing or by processing data at the level of zone with analysis of descriptive and spatial potential to choose a place for certain use.

Design: Designing is done after positioning; i.e. when the desired location for an activity is chosen then, regarding the type of activity and the application considered for it, the internal space, facade, facilities, and building and its components should be designed properly (Rhanamaee, 2006:74). In other words, it is a process beginning from the thought and ending in a product. The effective factors on design include as follows:

✓ Purpose;
✓ Site, topography, the ground shape and adjacency;
✓ Social and cultural factors;
✓ Geographical factors
✓ Effective factors in climatic conditions,
✓ Designing physical plan of design;

The reason for statement and description of three main terms in the area of positioning is that sometimes it is seen that these terms are not much different, are interchangeably applied; thus, in case of infrastructure and important activities of the country which influence the whole country, before anything we should zone and choose the optimal zone for establishment of a police station activity.
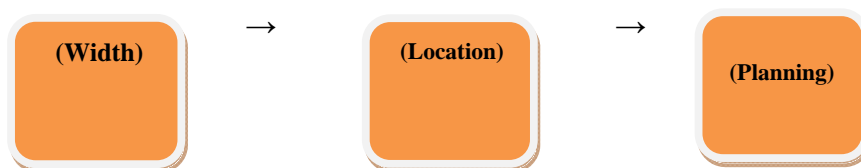

Figure 1: The relationship between the three main discussions of positioning

Practical pattern of positioning

The proposed model for choosing an optimal location or site includes 6 steps that by doing each properly at the end we can choose an appropriate place for each activity with high reliability; of course the main emphasis is on choosing a place for police stations. Steps and stages taken to choose suitable place are offered below; obviously these stages should be performed step by step and each step of the pattern are mentioned in the order they should be done.

Methodology

According to the nature of the city, as a complicated and combined social- spatial system, the best approach in recognition of the structure and model of the research, is to use the process of combining methods that suites the research by organized case study. The process of combining methods gives the possibility to use quantitative and qualitative methods together and avoid subjectivity and discrimination. This is a trend recently confirmed in urban planning studies.

Data collection tools

In order to collect data for this study, the following tools were used:

✓ Using library resources such as documents, books, statistics, plans and all resources associated with the subject.

✓ Using internet network for the freshness of topics, for getting information from the last scientific achievements in the present research.

✓ Field study including reference to the place, viewing and field perception for informing the city center.

Introducing an optimized location or site for the establishment of different police units

An optimized place for the activity under study is to suggest some optimal places with different priorities so that in case of any problem in the first priority, other priorities can be used. Undoubtedly, positioning as one of the important principles and elements in crime-prone areas is the best way to prevent by police stations.

✓ Neighboring places with critical areas' values

✓ Appropriate distance from available police stations

✓ Being near to main roads

✓ Being near to the market

✓ Populated areas

Fitness model

The purpose of this model is to find optimal places. A fitness model may find appropriate places to create a police station. Thus, appropriate places for a police station can be found as figure 2:
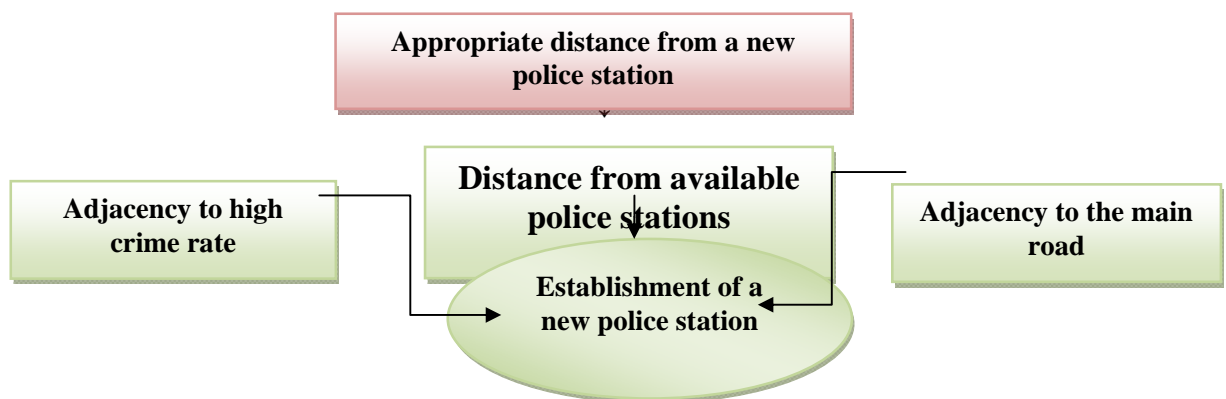

Figure 2. Fitness model for appropriate places for a police station

Providing a fitness map

Figure 3 is a Chloropleth map. This figure shows crime rate based on each area. It shows appropriate distance around 13 Bahonar police stations, which is used to find areas farther than 50 meters from main roads and appropriate distance from the available police station and in the critical areas.
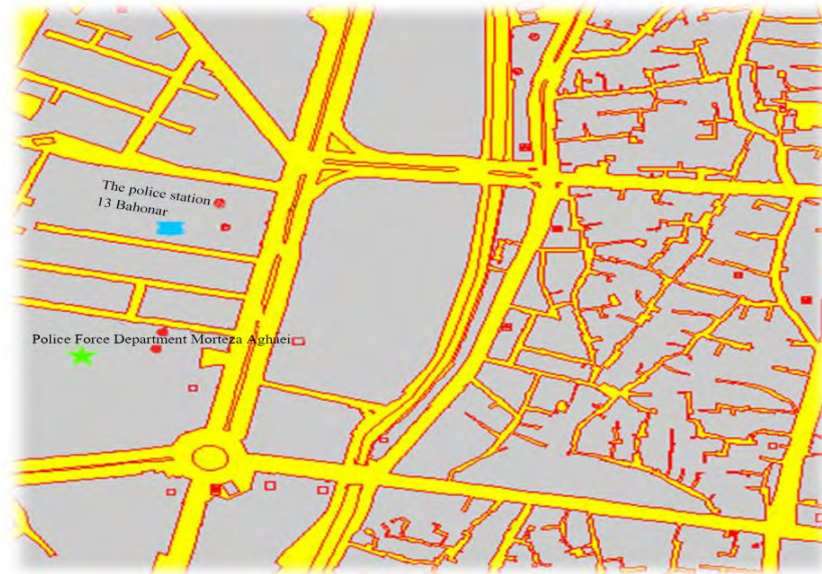
Figure 3. Chloropleth map for showing crime rate

Statement of the problem

In order to solve the spatial problem, we should first try to clarify our objective. By understanding the output, we should study and imagine the type of plan we want to prove. In order to recognize this step process, a sample problem is mentioned at the end of this chapter. The sample problem is finding the best place to create a new school. The result we are seeking is a plan which indicates the level of potential of available places to build a new school, categorized from most inappropriate to the most appropriate. This plan is named the categorization plan of the potential (fitness) level.

Analysis of the problem

In order to explain the problem, it is divided into smaller sections so to be able to decide to do which step for each part. By doing these steps, the problem would be solved. In positioning for establishment of police station, it is better to consider the location of police station near to the crime-prone locations so that new residents of that neighborhood who have children can use appropriate facilities of the accommodation area. It is also important that new police stations be far from other police stations so that their dispersion around the city be proportional and uniform, also this police station should be in a standard, appropriate and rather flat ground.

Checking the input data layers

The input data layers should be checked to get familiar with them. Doing this includes recognizing, familiarity and obtaining important and useful information that can be obtained from descriptive information available within each information layer or from among different data layers and the behavior trend of data whose recognition and the way to use them helps their solution. We can see the location of schools and promenade places and from the height information layer of the area, we can find out where the highest places of the area are located. Sometimes, it gives you information about various uses of the area which helps us to obtain information about the communication among ground uses and other information parameters.

Using identification tools to gather descriptive information about any side effects in all data layer

    ✓   Checking descriptive information bank about each information layer

✓   Providing a histogram for layering and analysis

✓   Calculation and producing the "shadowing" for the investigation and topographic land

Analysis of process performance

Up to now, we have decided about objectives of the issue under study, their elements and interactions, process models and what information layers needs as input. Now we are at the process implementation level. In the sample problem "finding the best place for building a new school" there are two methods for information analysis. The first method is to provide a "suitability" plan. Another method which can be simply done is to make query among information collection to provide an output result in Boolean form (if by cellular value in output layer is true, it means that at the position of this cell, conditions defined for Query should be met.

Providing suitability plan

Providing a suitability plan make it possible for each position, any desired cell in the context study, we have a relative number which somehow indicates the limited suitability of that cell to use in making decision and choosing the best place. We can consider areas that should not be evaluated and calculated as No Data and turn their value to No Data. If we have valued all parameters affecting our decision making as different layers of spatial information, so that all of their values are in a common and same scale and gives same importance to input layers in determining the most suitable position. This model was simply created at first, then different states of it can be studied and suitable models can be created by practicing weight coefficients for different layers.

Considering an scale for suitability

Most scales are artificial and unreal. They are mostly used as a grading criterion from the worst to the best. Suitability can be determined based on grading parameters and information layers whose amounts are measurable like distance from the police station). Also estimating distance from police station whose grading and valuation with regard to suitability for positioning a new police station is considered an important criterion in measuring and making a suitability plan. In most scales, it is used for valuating information layer, the amount of values allocated to each class has no linear relation. This is done to save money and time and or all required information are not taken into account. For example, if we decide that an scale be determined as a subject for "travel distance", if we want to travel 1, 5 or 10 km distances, values given to each distance as suitability, are not categorized as 1, 5 or 10 km. because some people may think that 5 km walk is only twice as bad as 1 km walk and however some others may think it is 10 times worse.

Categorization of crime-prone areas

In order to locate a police station around crime-prone areas, it is necessary to know the distance of police station from different places (Figure 4). By the help of Straight Line Distance function in SA software, we can create such a plan. We should calculate the performance of this function and save this distance in the position of each cell. The result of using this function is to create a correct information layer in the output whose value indicates distance from the nearest police station. In order to categorize this plan, we can simply use Reclassify.
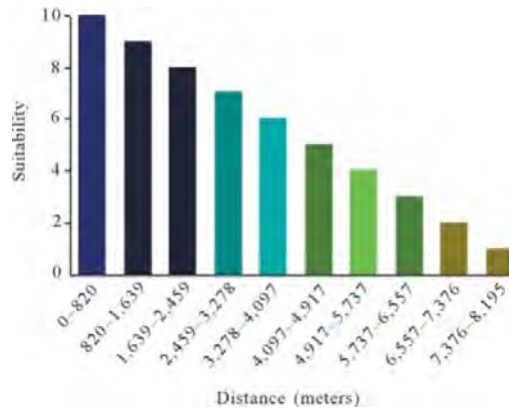
Figure 4. Distance of police station from different places.

Categorization of study zone with regard to flatness

In order to make a police station, it is better to prevent grounds with steep slope and choose locations with rather flat grounds. Besides, closeness of the police station to the main road should be a positive element. Therefore, we should assess ground's slope (the calculating function of slope creates such a plan by Spatial Analyst. In this way, changing values of every cell compared to its adjacent cells can be observed. In order to classify the plan, we can use categorization of (Reclassify).
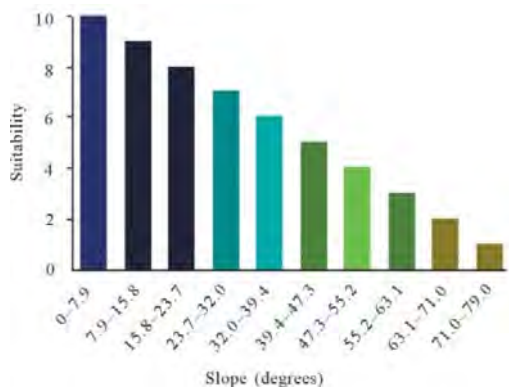

Figure 5. The slope of police station to the main road

Categorization of zones based on suitability of their lands' use

In order to categorize the land use plan, the Reclassify categorization should be used. The simplest way to decide about which type of land use are appropriate for construction (how is the priority of their categorization), first, the worst option should be chosen among options and then among other uses remained, again regarding the best and the worst option, we should decide and choose the best (Figure 6). We should continue this until all types of uses are arranged based on suitability. Water retention and marshy land was not suitable for building and remove them from the list of programs.
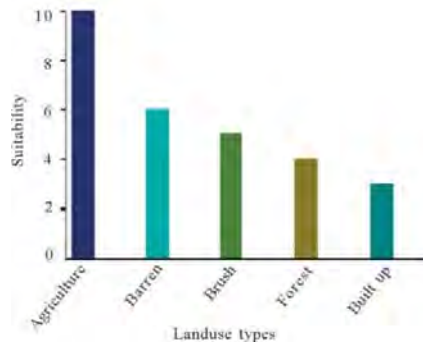
Figure 6. Type of land use appropriate for construction

Composition of suitability plans

The last step in design and providing a plan is the suitability of the composition of all plans, suitability based on distance from police stations, distance from crime-prone areas, slope and use of lands. If all topic layers are equally important with regard to weight, in this stage suitability plans can be easily combined by Raster Calculator. It should be noted that when we divide your problem into smaller sections, the most important purpose for success is to find a police station near crime-prone areas and far from available police stations. Considering the fact that some parameters and purposes in the evaluation model for a suitable choice is highly important, information layers should be weighed based on importance and layers that should have more importance have more weighing value than others. In the sample given, the basis of effective coefficient of each plan, their suitability that numbers are divided into 100 for calculating their percentage (to normalize coefficients) these normalized numbers and in order to determine their suitability, plans are evaluated.

Since a scale is considered to evaluate suitability, weighing is an important step in modeling process which depends on the importance of each subject and purposes in the plan under study.
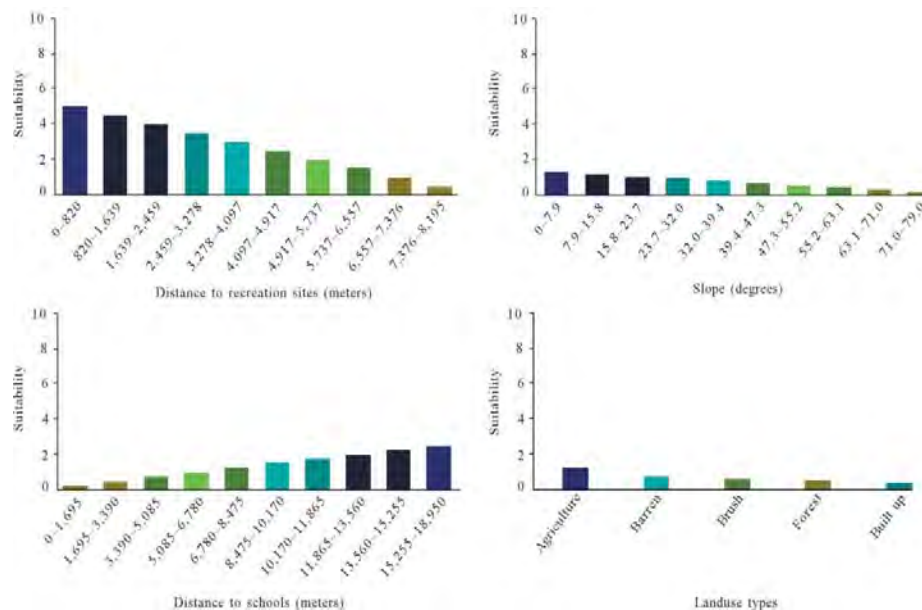

Figure 7. Weights allocated to determine the level of plans' suitability

Weights allocated to determine the level of plans' suitability

Consider the fact that how the value of available cells in each plan and their suitability (by considering the weighs' coefficients) changed. The final plan of suitability is produced by combining all plans, as doing the process of combining all suitability plans made by Raster Calculator of SA software, layers weigh can be allocated to the relevant layers. The output result of this calculation statement is an assessment plan of suitability which shows appropriate locations for establishing new constructions (Figure 8). Locations of their cells with higher values are places that are more appropriate for establishing a police station.

Data Querying

There is another method, similar to the previous method, which works according to Query among input data and is applied instead of the previous method (the way of producing suitability plan) to find an appropriate place for establishment of police station. When all the necessary information layers are provided, data can simply be surveyed and appropriate places can be found. By doing this method, other qualified points, determined by conditional statement are chosen and recognized in output layers, desired conditions that can be determined in conditional phrases. If you want to determine a Query statement for Raster Calculator of SA software, it is written as follows:

[Landuse]= = 5 & [Slope] < 20 & [Distance to rec_sites] < 1000 & [Distance to School] > 4000

The output result of this conditional phrase is a Boolean map, in which it is True if the cell estimated by Query has value and is appropriate and in case of negativity, False is shown).

Confirmation of model results

If the results should be controlled and their accuracy should be assured, the control bear better results. If possible, field observation of potentially suitable places should be done. Usually, there are other things in the results obtained from processing that in order to remove them we should do modeling and the primary choice condition along with exact calculation should be performed. For example, the location proposed for police station, are not appropriate for building a police station if the necessary certain conditions are not satisfied. In both cases, it is necessary to use this information, obtained from field study, in processing as well as completing input data and making decision about output data.

Application of outputs

The last step in spatial modeling is to use the outputs that are considered in building a new police station in proposed location.

Appropriate sections for a new police station

A technique for spatial analysis is Vovoni diagrams that have wide application in many Principles. Vovoni figures or heissen Polygon divides a planned area to a number of polygons. Each polygon is built around a produced point. Almost all ranges may change. The main reason is that this place exists for police department which reallocates all police stations' ranges. Therefore, the buffering method (interposition) is used around appropriate area which is similar to what is shown in figure 9 and 10, buffering conclusion only shows reallocation of ranges in neighboring areas.
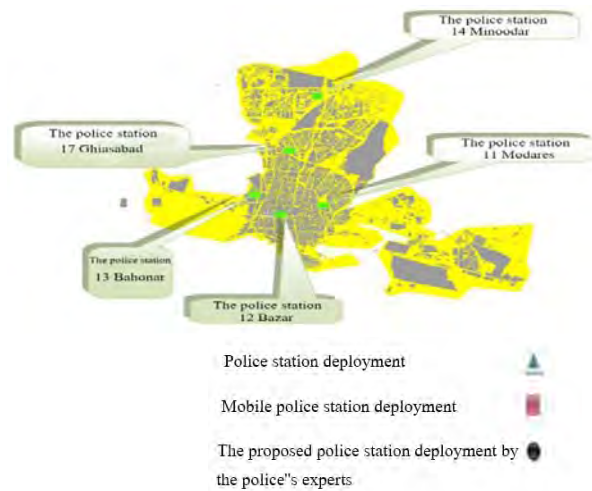
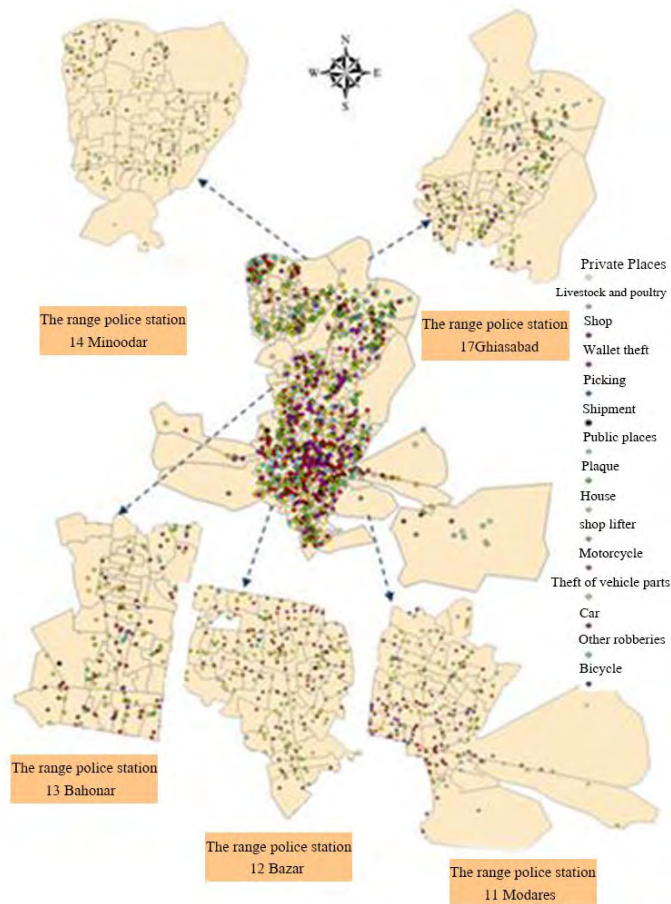**Figure 8. Police and mobile police station deployment**

Figure 9. Reallocation of ranges in neighboring areas

Development of strategies

By taking the results of this study into account, the following strategies can be drawn:

✓   Enhancing awareness and culture of City residents (especially slum areas)

✓ Improving the quality and the possibility of easy access to public transportation throughout the city and increasing capacity in order to meet citizens' need easily and fast

✓ Improving and organizing city's old texture: developing financial infrastructure and providing urban services and working for providing jobs and increasing the security of urban economy.

✓ Having the minimum level of public hygiene and health services, in the way that these services are provided for every one;

✓ Solving the problems of city's traffic and pollution (Sound pollution, visual and air pollution) and special attention to urban sustainable development.

Conclusion

The proposed pattern for choosing appropriate place or site includes 6 steps that, by properly doing each of them at the end an appropriate place , can be chosen for any activity type and with high reliability although the main emphasis is on choosing a place for Naja units. Steps taken to choose an appropriate site is suggested below; the purpose of this model is to find a suitable place. A suitable model may find a suitable place for establishing a police station. Thus, ideal places can be found for a new police station. By doing each step respectively we can achieve appropriate places with better conditions and increase the efficiency and quality in this field by attending to correct positioning.

In this system, in different areas and cases, different steps can be taken which are different according to principles and policies of each country.

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