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A Study on the Urban Renewal Model for Blighted Areas

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〈Abstract〉

Traditionally, renewal of blighted areas in Korea's cities has proved to be as complex and difficult task.

Computerized Urban Renewal Experiment is new method to solve various problem facing Urban Renewal which provides for a definitive optimized solution for a given land area.

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〈요 약〉

한국의 대부분의 도시의 불량지역 및 노후지역에 대한 재개발 계획은 오래전부터 계획, 시행되어 왔으나 계획과정에서 포함해야할 여러 변수를 체계적이고 충분히 고려하지 못하기 때문에 재개발사업시 많은 문제를 초래하게 되는데 Computerized Urloan Renewal Experiment에 의해 계획시 최적해를 합리적으로 구할 수 있어 계획전에 비교적 충분한 검토를 할 수 있는 장점이 확보된다.

I. Introduction

Most of the older cities in Korea are suffering from blighted areas. A preliminary design progrom for the restoration of a blighted area of a city should specify the type of housing to rebuilt. where it will be built, what financing scheme will be used to build it, and what preportion of the residents already living in the area will be able to afford to continue living there. This blighted urban area often contains certain units which could conceivably be rehabilitated. In order to carry out the preliminary optimal design for the allocation of housing types and financing programs, a computer program has been provided as a planning tool or model whcih can be used to improve the efficiency of the planning process in urban renewal areas. Complicated and interrelated variables may be considered with increased versatility and greater depths of understanding, and in a much shorter period of time with the aid of the digital computer. The increased efficiency allows greater consideration tobe given to the desires of the existing residents, thereby enhancing the satisfaction with urban renewal projects.

Systems engineering techniques for the allocation and financial planning of new and rehabilitated residential units in urban renewal areas have been developed. The objective is to provide a planning tool or model which can be used to improve the efficiency of the planning process in urban renewal areas. The model employs procedures which take data concerning individual parcels in a renewal area and, subject to certain economic and physical restraints for an optimal solution involving one or several object functions, e.g., such as to provide a certain number of acceptable housing units at minimum cost. A definitive solution is ultimately presented which specifies building types, number of new units, number of rehabilitation units, and other relevant information for all land parcels in the area considered. In addition the monthly occupant payment required to pay off construction of the units on each parcels computed under various financing programs.

After determining the building types and the rents required under different financing programs, the procedures aid in deciding how to allocate the parcels among the programs available. This is done by correlating the income and family size distributions with the restrictions to determine who is eligible under each program. If there are enough persons eligible to make it feasible to allocate a parcel or parcels to the program, then the parcel is allocated to that program.

Table 1 Normal & Slum Housing in Korea

Region	Total(A) Housing	Normal(B) Housing	Slum (C) Housing	$\frac{(C)}{(A)}\times 100$ (%)
Nation-Widel	4,442,961	4,077,005	365,956	8.2
City	11,428,508	1,159'440	269,068	18.8
Smal Town	412,062	386,849	26,213	6.4
Country	3,014,453	2,917,565	96,888	3.2

Sources: Economic Planning Board,
Population & Housing, 1973

In larges cale multidisciplinary urban projects of the kind now facing Korea's cities, it is necessary to have a versatile tool to handle the complexities of the preliminary planning. The increased efficiency in the allocation of land, materials and residents which can be realized by the use of this program should greatly enhance the value of urban renewal projects while reducing cotsts to acceptable limits. The model described herein serves as a planning device for a complex interdisciplinary probleminvolving the housing allocation in a given area to a particular group of people.

Program Philosophy-Any planning model as complex as the prepared herein is bound to

Table 2 Housing Shortage & Slum

City	Pop (1,000)	Household (1,000)	Sum of Housing (1,000)	Housing Shortage Rate (%)	Slum Housing
Seoul	5,536	1,097	597	46	168,307
Busan	1,881	372	213	43	43,743
Daegu	1,083	218	104	52	13,643
Inchon	646	127	73	43	[illegible],667
Kwangju	503	90	49	46	855
Daejeon	415	73	42	43	2,983
Chonju	263	47	27	43	1,779
Masan	191	37	23	38	3,507
Mockpo	178	33	20	39	384
Suwon	171	33	20	39	1[illegible],834
Uisan	159	32	19	41	1[illegible],571
Chongju	143	27	17	37	32
Chinju	122	22	15	32	614
Chonchun	123	24	13	46	1,139
Yeoosoo	113	21	14	33	3,885
Wonju	111	21	12	43	1,269
Goonsan	112	21	13	38	578
Cheju	106	24	18	25	578
Choyungju	92	18	13	28	471
Uijongbu	95	19	11	42	762
Choongju	88	16	11	31	208
Soonchon	91	16	11	31	271
Chinhae	92	19	11	42	447
Iree	87	16	9	44	1,344
Sockcho	73	15	10	33	340
Chonan	78	14	10	29	365
Pohang	79	16	10	38	197
Kangnyung	74	15	10	33	517
Andong	76	15	9	40	470
Kimchon	62	12	8	33	322
SamChonpo	55	10	9	10	470
Choongmoo	55	11	7	36	345
Total	12,955	2,531	1,429		260,375

have incorporated in it certain prejudices and desires of the formulator. This is not to say that the model cannot be used effectively if the planner does not concur with the desires of the programmer; it is just that the inherent planning factors should be spelled out if the planner is to make full and effective use of the program. However, by ignoring or canceling out these inherent program goals, the overall effectiveness of the program is decreased. Therefore, the general goals of the program are spelled out for the edification of the potential users.

In addition, the planning model has built into it some heuristic features are inherent in the optimization procedure. They require the planner to make decisions on the relative desirability of certain object functions. The importance of this feature to the inexperienced designer is considered in the section on heuristics.

Ⅱ. Program Description

Program in General. -All too often, urban renewal in Korea is carried out in a haphazardpiecemeal fashion, or in a total demolition mode in which all the structures, whether they are rehabilitable or not, are removed from a given area. The former case brings about chaos and the loss of possibly rehabilitable structures, while the latter brings about destruction of a sense of neighborhood and a disbursement of the former population. Evidently some mixed of planning is desirable where both the neighborhood identification can be preserved and certain erhabilitated structures are preserved. One of the aims of the program described is to make available to the designer just such a mixed mode planning option. Another aim of the program is to allow the designer to retain the feeling of the neighborhood by providing housing for a large number of the area. Although the cost of providing housing for all the inhabitants may be excessive or impossible from certain other constraints, at least the designer has the option of altering this important constraint. Another part of the model is the ability to differentiate between the apparent short range costs which make many project seem more desirable, and the long range costs which planners often do not consider and which often have an important bearing on the economic feasibility of the project.

Therefore, the philosophical features and goals which are incorporated in the program are that: (1) Rehabilitation should go hand in hand with any new building; (2) the planning processes should take into account the largest coherent demographic area possible; (3) the largest percentage of the people that were living in the area before renewal should continue to afford to live there after renewal if they so desire; and (4) the possible long range costs should be given as much consideration as the apparent short range costs.

Heuristic Aspects. -The planning program now has in it certain heuristic features that are coupled to the optimization portion of the program. The multiobject features of the optimization procedure require the planner to decide and the relative desirability of various object functions, e.g., full accomodation of previous area residents versus cost or some specific percentage versus some specific cost. More experienced planners can construct these desirability tables quite easily' but for planners with less experience the formation of these tables can be carried out heuristically. Furthermore, the various constraints in the program can easily be altered and the effect of these alterations on the resulting desirability of the project can be evaluated. Therefore, the planner can determine heuristically the effect of various parameter or constraint changes.

Program Overview. -The urban developer or planner is interested in solving the urban housing problem of his city in the most humane way possible. In most cases this means providing better housing for the people who already live in the area. Each area under construction has definite characteristcs such as cost, irregular land features, existing structures, code restraints, etc. Out of these characteristics and restraints the planner has to decide: (1) What types of units to build them; (3) how many to build; and (4) how to accomodate residents who previously lived in these areas.

The answer to the preceding items will depend on the planner's goals and constraints. These goals might be to house a certain number of people, to provide park lands, to have physically appealing housing develpments, and to have low rents. The constraints might consist of budgetary requirements, or availability of funds, or certain political realities. Some of the goals and constraints will be contradictory or impossible to attain simultaneously. Because there are numerous goals and constraints due to the complexly interrelated variables which affect the outcome of a design, it is advantageous to program a computer to aid in the solution of the problem.

Some of the variables involved are likely to be: (1) Variation of land costs across the area; (2) variation of land features across the area; (3) types of new units to be considered; (4) cost associated with each unit; (5) land requirements associated with each type(such as irregularities in slope, discontinuities, etc.); (6) zoning restrictions; (7) existing rehabilitable units within the area(location); (8) cost of rehabilitation; (9) desired density of project; (10) desired free land for parks; (11) methods of finance; (12) associated rents; (13) number of families needing housing; (14) family income profiles; (15) family size profiles; and (16) family housing preferences.

Probably the first decision which has to be made is the division of the large areas of land into smaller parcels. Many current developments have divided the land uniform rectangular parcels. This is undeniably neat, but the depressing uniformity of block after parallel block of construction is something to be avoided.

To get away from this, parcels can be designed in a quasi-random fashion by a computer. The large areas of land are divided into small grid sections, and the computer generates random numbers which correspond to grid sections. These randomly picked sectios are then combined to form irregular shaped parcels of land.

Deciding what to build and where to build it is the next complex problem to be considered. The number of interrelated variables is considerable, and it is impossible to look at a few factors and come up with the best solution. It takes many tentative design solutions which must be systematically compared.

The computer program takes the first ten variables on the list to develop the tentative design solutions. What to build and where to build it is decided in a random fashion using the random generator to pick types of units, numbers of units, and locations of units. These randomly developed trials are first tested against certain basic requirements; e.g., is there enough land for the number of units picked, are the minimum unit requirements satisfied, and are excessive numbers of units being provdied? Other checks are mentioned in the detailed analysis. Once the basic requirementsare satisfied, the trial is compared with the best solution thus far achieved. Best means that it satisfies the constraint equations better than the others, where the constraints and definitions of better are inputted by the planner; better may mean less costly, for example. If this current trial is better, it becomes the current best solution against which future trials are compared.

After the allotted random search time is finished, the computer takes the current best solution and goes on to the global optimization. The current best solution, called the Tentative Design Solution, is now compared with the remaining variables involvede in the solution. The rents associated with each parcel, which are different for each type of financing:private, state, federal, are calculated. These rents and the numbers and sizes of the units are then compared with the family profiles for the existing residents. These profiles consist of size and income distributions. Thus these families have certain requirements for housing, certain rent paying abilities, as well as possible eligibility for federal or state housing aid programs.

If the families make enough money to pay the rent required under private development, they are allocated accordingly. However, if their income is too low, then the families are tested for eligibility under various programs, which is a function of the size of the family and their income. Each program results in a reduced rent which is compared again with their income. If there are enough families eligible under a particular aid program to occupy a parcel, and if they can afford the resulting reduced rent, a parcel may be allocated to a group of families. The exact procedure is explained in greater depth in a later section herein. The program attempts to allocate the people in such a way as to spend as little government money as possible.

Once as many people and parcels have been allocated as is possible under the given funding conditions, the associated long and short range costs, which involve amounts paid by the consumer and amounts paid by the government, etc., as well as the land characteristics, which include parcels which were not allocated and are therefore free land, project densities, etc., are compared by use of the Blight Ranking Matrix. This ranking matrix governs the optimum solution. Certain variables chosen by the planner are altered in a quasi-random fashiog and the program reinitiates at the beginning, picking a Tentative Design Solution and allocating units, using the Blight Ranking Matrix to determine if the new solution is better than the last. The search is continued until an optimum is reached.

Other Models.-There is a wide range of approaches which may be taken in the investigation of urban problems. These include panning games such as Metropolis, CLUG, and CITY I, and METRO. Prediction or forecast models such as the land use plan models, and direct planning models such as PLUS and CURE are also employed.

The planning games serve a useful function in helping the planner understand something about how a city works. They may or may not utilize a digital computer. They do not suggest possible planning schemes nor do they usually include optimization techniques.

The forecast models are also helpful planning tools. The output from these varies from a general description of the economy at some future time period, to a definitive description of new construction, rehabilitation construction, types of unit, locations, and costs. Examples of these are Community Renewal Program as described by Barringer et al., which was developed by A.D. Little, Inc. for San Francisco, and the land Use Plan Model developed by Schlager. These, as stated, are basically forecast models. For example, the Schlager model uses a forecast of population and employment to determine future land requirements. This is then applied to determine aggregate demands for the different lands aivlable. A linear programming technique is used to minimize pubic and prviate investments subject to planner design constraints. The results include type of land use, density of land use, and geographic location. The CRP model also incorporates a time function, but is basically oriented toward the residential sector. The output is more definitive in that it specifies details of the construction types and locations.

However, when planning a development for immediate execution, direct planning aids are necessary. The model proposed herein is one such example. Another example is the model

PLUS(Planning and Land Use System). PLUS finds solutions which satisfy the planning-design parameters. However, it does not try to optimize any of the functions involved, nor does it provide definitive to spatial location rather, it presents answers in terms of the percentage of the totat site land area which is to be used for different construction types.[1]

The model does not appear to consider the possibility of CURE as a planning tool aud a heuristic learning device makes is an extremely useful model. The use of the random search optimizer allows the incorporation of nonlinear functions which linear programming techiques cannot handle. The definitive spatial orientation of the model gives the planner a good understanding of the site under consideration. Because of these features it seems that CURE is unique in the field of urban planning.[2]

The afore mentioned models are certainly not the only models available. Details of some were presented for the purposes of illustrating the differences in approach and by no means should be construed as a value judgment on the ones omitted or included.

Program Aids.-The overall program aims are to provide planning aid for determining an optimal housing mix for a given blighted area. The purpose of the program is to effectively evaluate thousands of alternate designs and to seek the optimal soltion for which several object functions exist.

Anotheraim of the provide a design aid which can be used to perform various sensitivity analyses and which can also serve as a heuristic training device for relatively inexperienced planners.

The program has been made as user-oriented as possible. That is, the planner can utilize the program with no previous knowledge of computer programming. The program has been made user-oriented to increase the probabilty that the program will be used by planners with little or no programming experience. Therefore, the final aim is to provide a viabl planning tool that will be a tremendous aid to planners trying to decide the optimal housing mix for a given blighted area.

Ⅲ. Model Description

Division of Land into Parcels.-The first task to be accomplished is the division of the blocks of land into parcels, which consist of sections. A block is a land area surrounded on four sides by a rectangle consisting of an access zone. A parcel is considered to be an aggregation of sections within a block. A section is defined as the smallest possible piece of land that can be aggregated into parcels. This dividing is done in a quasi-random fashion in order to avoid excessive uniformity. A block is divided by the planner into grid sections for the purpose of data input. These sections are then combined randomly, subject to certain edge conditions, into parcels.

In making up each parcel, the initial section to go into the parcel is chosen by generating a random number between zero and one. The number of the section which makes up the first portion of the parcel is INTEGER in which N is the number of sections in a block and RI is the random number. The rest of the sections which go into the parcel areo choseo by generating a random number as previously stated, but these new sections must satisfy certain conditions before they will be added to the parcel. The new section that goes into the parcel, i.e.,

(1) CLUG(Community Land Use Game) was orignated by Feldt at Cornell in 1966, It emphasizes economic aspects of Urban development. There are a banker, who managesthe game, and three teams of players, whoassum the role of developer, Schlager, K.J., "Land Use Plan Design Model," Jouanal of the American Institute of Planners, Vol, 31, No. May, 1965, pp. 103—111.

(2) Forrester, J.M., Urban Dynamics, The MIT press Cambaidge, Mass, 1969.

it must be above, below, left or right of any already chosen section of the parcel. Of course, no section may be pe placed in more than one parcel. When the number of a chosen section is greater than or equal to the number of sections already chosen for the parcel, no more sections are added to that parcel and a new parcel is begun.

The method used to start a new parcel results in the possibility of some sections not being allocated to a parcel in the initial part of the procedure. Thus before terminating the procedure, a check is made to see that all sections have been allocated. If any section has not been allocated, it will be allocated to the parcel above, below, lift or right of the section in a random fashion.

When all of the sections have been placed in placed in parcels, the input information for each section, such as land cost, area, and rehabilitation data, is combined into new matrices to represent each parcel. Each block is divided into parcels in the aforementioned random manner until all land on the project is used.

The project now consists of land which is divided into randomly generated shapes upon which a certain type of housing may be built. By randomly generating these parcels, the uniform characteristics of so many urban housing projects has been avoided. It is then necessary to decide what type of housing to use, how many units to produce, and where to place them. This will also be done in a random fashion. The speed of the computer will allow the testing of many different combinations, subjectiong them to constraints, and thus working towards a more economical solution than is possible withot the high speed digital computer. Ofcourse the constraints on the solution need not be solely economical, and can include any other considerations the planner deems necessary.

Forming and Restricting the Solution.-To form a solution to the housing allocation problem, the first calculation involves the determination of whe ther or not it is possible to put the desired number of units on the total land area under consideration. To do this, the model must first compute for each parcel the maximum allowable number of each building type under existing code restrictions. This is determined by considering the parcel area for each building type, the zoning regulations, and assumed distribution of unit sizes, i.e., the number of bedrooms. Then, for each parcel, the largest of these values is compared with the maximum possible number of rehabilitation units, and the larger of these two values is selected as the maximum number of units for the particular parcel. The sum of these values gives the maximum number of additional standard units possible on the given parcels. If this is not greater than the desired number of units, the mode can go no further and some changes in the number of units desired or the available land are necessary.

If the maximum number of units possible is greater than the number desired, the model requires an initial feasible solution. The maximum number on each parcel is automatically selected as the initial solution, i.e., current best solution, unless the planner supplies some other solution, from an earlier run, for example.

From this point on, the model searches for a better solution by modifying the current best solution and checking to see whether or not the resultant solution is an improvement over over the current best. The crition for this improvement is explained later.

Modifying Solution-In modifying the solution, the following procedure is repeated for each parcel. First. First, the number of new omly selected number has to be translated into a construction type, i.e., single, three story, greater than three story. The model considers all building types which could feasibly be built on the parcel. There is no case in which the nu-

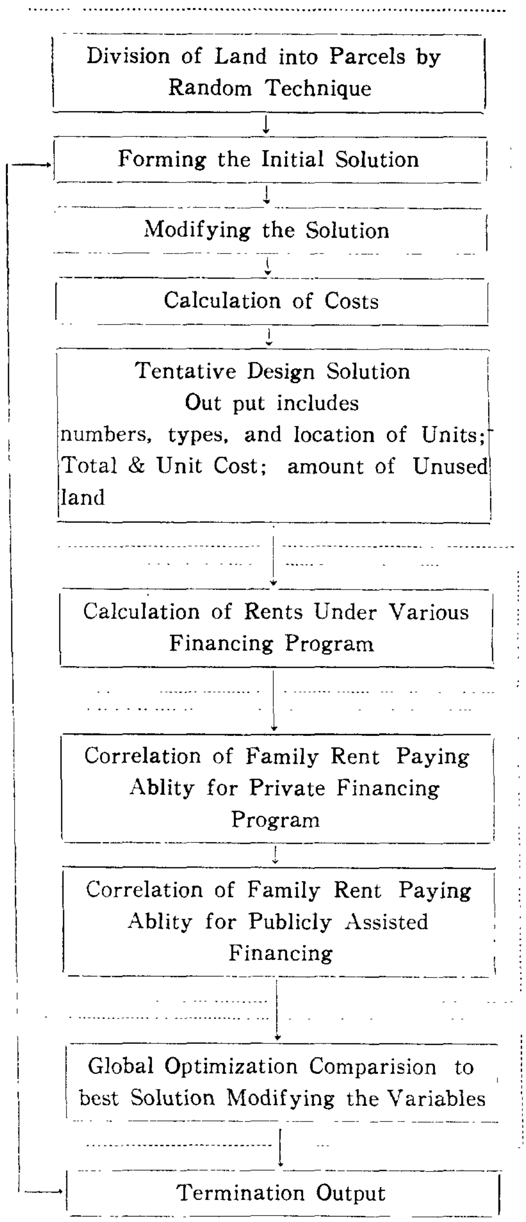

Fig. 1. General Program Flow Chart

mber of new units can exceed the maximum number allowable on a particular parcel being considered nor is it possible for the number of units to be less than the number required for a given type of building. The eligible building type with the lowest average unit cost on that parcel is then selected. Once the revised number of new units and the construction type is determined, the percentage of the parcel area taken up by new units is also determinde. The basic assumption is that rehabilitation units are equally distributed on the parcel and, therefore, the percentage of the parcel used for new construction decreases the amount of rehabilitation units possible. The original maximum number of rehabilitation units in the current best solution is modified with a random procedure identical to that previously used to modify the number of new units. The difference between the number of rehabilitation units selected and the maximum possible can then be used to determine the amount of land, if any, which is unused or unassigned for either new construction or rehabilitation.

Costs of Random Solution.-As soon as the randon number process has picked the modified solution, the costs are calculated. The cost of a new unit is the sum of its construction and land costs. The correct land cost is determined by assuming that the units will require only the minimum land allowable by zoning regulations and, therefore, can be calculated by multiplying this zoning area requirement by the cost per square foot of land on the pqrcel being considered. The cost of a rehabilitation unit includes the acquisition cost of the unit. To determine the land cost, assume that units are evenly distributed on the parcel so that the total parcel land cost divided by the total possible number of rehabilitation units yields the land cost for rehabilitating a unit on a particular parcel. Total cost is obtained by summing all proposed units, new and rehabilitation, for all parcels. Total cost divided by the number of units provided for by the solution gives the average unit cost for the whole project.

Search for Tentative Design Solution.-After modification and cost calculation, the modified solution is tested for acceptability and improvement over the current best solution. The new solution must provide at least the minimum number of desired units in order to be acceptable. Other requirements for acceptance which may be executed by the planner are that a certain distribrtion of bedrooms among new aod rehabilitation units or that a cortain distribution of aech type of housing unit exists across the entire project, or both.

UP to this point a solution has been formed, modified, costs have been calculated, and the modification has been compared with the previous solution. The more acceptable solution then becomes the current best solution.

Each time the model finds a more acceptable solution, all the relevant information abnut that solution may be printed out if desired. The information includes the following: total number of units provided, total land cost, total construction cost, total cost, bedroom size profile of new and rehabilitation units and an average of the two, housing-unit type profile of new construction, and, for each parcel: building type of new units, number of new units, number of rehabilitation units, average cost of a new unit, average cost of a rehabilitation unit, and the amount of land unused.

This entire cycle of getting an improved solution can be repeated until the best solution is reached or until a certain amount of land unused.

This entire cycle of getting an improved solution can be repeated until the best solution is reached or until a certain amount of time has been used. The model now proceeds to the financial setion of the programwith the Tentative Design Solution. Utilizing the vital information of the number of the number of new and rehabilition units on each parcel and their respective unit costs, together with basic economic data concerning the state of the economy, the required rent for a unit is then calculated and an optimal financing solution may be determined.

Financing Best Solution. —Once the best solution possible has been reached, i.e., the Tentative Design Solution, the model calculates the basic tenant payments required to pay off the costs involved in development and maintenance of the housing project(see Fig. 1). The amount which a tenant must pay will be a function of the program under which the particular building project on the parcel is financed. Note here that it does not matter whether a unit would be owner-occupied or rented because in the former case the owner is considered to pay rent to himself.

The total development cost of a unit, which is the sum of land and construction costs, is the figure which forms the basisfor the financing calculations. The exact monthly ocupant payment is influenced by a number of factors including the amount of downpayment required if any, the debt service required bythe mortgage, occupancy costs, the vacancy rate, and the developer's designed return on investment. The downpayment, which is the developer's investment, can vary rom zero to one-third or more of the total development bosts and it is on this investment that the developer's rate of return is based.

Final Optimization. —The program has now executedall of the previoudly described procedures. The parcels have been created, a Tentative Design Solution has been developed and then modified by the realities of rents, financing programs, families, and incomes. This resuitant design has a certain value which is a function of a number of different factors such as costs, free land, number of parcels occupied, etc. Each factor is, in turn, a runction of certain variables which, if changed, could result in a different solution if the program was rerun.

The factors to be optimized are chosen by the planner. Typical factors might be long range cost, fre e land density of construction, availity of governmental funding, and past resident occupancy rate. The variables which are to be changed by the random generator are also inputted by the planner. These variables will affect the solution and thus alter the rank of object functions. Typical variables might be the minimum land required fora unit, i.e., the zoning requirements, the minimum number of units, or the income intervals of families tobe considered.

Procedure OPTIMZE is used to optimize factors subjected to a number of changing variables. The change in a given variable is mace by using a random generator. The change in the various object functions or optimizing factors is indicated by a desirability index. The value of a certain result is ranked by comparison with the range of possible results in a predetermined Blight Ranking Matrix. The location of each factor in the ranking matrix gives the rank of the factor. Equal ranks are equivalent in value for each factor. That is to say, a rank of 3.0 for Cost would have an equivalent value to a rank of 3.0 for Park Land and so on. The Ranking Matrik contains the range of possible results for each factor. The planner decides this range and inputs to the program information which tells the computer the range and the corresponding ranks, that is a range of A to B is given a rank, C. The lowest rank is the best rank.

There are two possible means to determine the value of the solution. The first method is to assume that the value of the solution is no better than the worst element. This mean that the factor with the highest rank controls the value of the total solution. When using this method, the computer scans the ranks of each factor. If the rank of the current run is lower than the highest rank from the previous best run, the current run parameters become the new best run parameters.

The second method assumes that there is an interchange between amounts of factors which will give an equal valued solution. The value of the solution is given by the sum of the ranks of each factor. The lowestsum is the best solution. As an example, consider two factors A and B; if RANK A=3.0 and RANK B=1, the solution just as goob as if RANK A=2.0 and RANK B=2.0. Thus using this method the computer the computer defines a set of curves of value. Any combination of ranks which gives an equal sum is equal in value. Any combination which gives a lower sum is higher in value.

The realities of the political situation indicate that the first methid may be more useful as this method tends to equalize the ranks over all variables. While this does not necessarily lead to the lowest sum, it may be a more politically palatable solution in certain situation.

By one method or another, the value of the first solution is determined. This is called the Factor Desirability Index(FDI). After the FDI of the first solution is determined, all the search variables are modified by a random procedure and the program is rerum. This will result in a different solution. The rank of each factor in the Blight Ranking Matrix is recalculated and the Factor Desirability Index is determined for the new solution(by eather method depending on choice of planner). This is compared with the previous FDI to determine which solution is bess. The better solution is called the CURRENT BEST and the variables are modified again and the program rerun. This cycle is continued for a given number of runs, or for a given length of time, or until an optimum is reached which cannot be surpassed.

The program has special value as a sensitivity analysis for certain types of urban design problems. Provisions are made for inputting specific data changes and rerunning the program with all the data unchanged except for one variable(this option bypasses the final procedure OPTIMIZE and uses the input data ZONECHANGE to modify the solution rather than the random generator). This enables the planner to determine the effect of changing one variable on the entire solution and givet an idea of the sensitivity of the solution to changes in certain critical factors like zoning.

Ⅴ. Conclusions

Traditionally, renewal of blighted areas in Korea has proved to be an exceeding complex and difficult task. In recent years, Government and private developer have accepted the idea that computer aided design procedures is reqired to overcome all sort of problems. Without computer aided system, they won't solve the difficulties effectively resulting from large scale development. CURE(computerized Urban Renewal Experimant) is a computer aided procedure that provides for a definitive optimized solution for a given land area. It will make the work of Urban Planner much easier, by providing him with optimum solution as well as alteratives, and by enabling him to see how his decisions affect the outcome of the solution. CURE also provides a heuristic device which will advance the planner's equivalencies, and of Urban Planning in general. As the size of the planning project gets larger the usefulness of the CURE program increases because the possible number of trade-offs increases. As the number of parcels goes into the hundreds, the utility and book keeping ability of CURE becomes more obvious.

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