

PERCEIVED PERSONAL CHARACTERISTICS OF OR/MS LEADERS AND THE GROWTH OF OR/MS ACTIVITY—AN EMPIRICAL STUDY

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Abstract The personal characteristics of Japanese OR/MS leaders which are considered to affect the successful survival and promotion of OR/MS activities in the organization through their evolutionary phases were empirically examined. Forty two OR/MS leaders at twenty four Japanese industrial firms were interviewed and asked to rank personal characteristics which they considered to be important for managing OR/MS group activities at each of the three evolutionary phases viz, missionary, transitional and maturity phases. Under the life-time employment and seniority-dependent promotion system, distinctive OR/MS leader patterns are difficult to determine, hence the opinion of OR/MS leaders was studied. It was found, among others, that OR/MS leaders should change as the OR/MS group progresses through their organizational evolution in such a way that the characteristics of technical orientation become less important while characteristics of organizational orientation become highly important as the group advances to the maturity phase.

Introduction

Over the past ten years there have been an increasing number of studies in the areas of organizational behavior of OR/MS activities and of implementation of OR/MS projects. The underlying purpose of these studies is presumably to find some significant characteristics of the organizational and operating mode of OR/MS groups for the promotion of OR/MS activities and for the successful implementation of OR/MS projects [8], [13], [17], [18], [19]. Most of the studies reported in the literature are based upon data taken from U.S. commercial, industrial and governmental organizations. According to the survey made by Keio University in 1974, 52.1% (sample size of 675) of Japanese firms

in the private sector have OR/MS activities in some form [6]. At Keio University, over the past five years we have been collecting data on these aspects of OR/MS activities in Japanese commercial and industrial firms in collaboration with Northwestern University, U.S.A. [4], [5], [6], [7].

The study described here is aimed at identifying factors affecting the success of OR/MS activities in the private enterprises and is an attempt to examine some of the important characteristics of OR/MS group leaders at various phases of organizational evolution of OR/MS groups. The degree of impact that a particular factor may have had upon the successful survival groups, in a given phase, was, in this study, evaluated by a judgement obtained through a series of personal interviews with present and past OR/MS group leaders. Because of the very nature of the objective of this study, factors that are discussed in ordinary leadership studies were not included. The emphasis was on factors that would seem to be peculiar to the OR/MS group leaders and dependent upon phases of the growth of the OR/MS group.

The life cycle model of OR/MS activities used in this study was presented by Rubenstein [14] for the first time as a birth and death process. The phases of organizational change of OR/MS activities were defined by Northwestern University group as five, viz., penetration (or pre-birth), missionary (or introductory), transitional (or organizational), maturity and death. The distinction has been used and revised by many in studying the organizational behavior of OR/MS groups [1], [15]. Common objectives of such studies were to answer such questions as:

1. What are the necessary and sufficient conditions for the OR/MS group to move from one phase to another?
2. What are the factors which affect the effectiveness of the OR/MS group at each of the phases?

These studies placed their emphasis upon the analysis of the influence of the various organizational variables upon the effectiveness of OR/MS activities [14], [15], [16].

Studies in the OR/MS leaders' characteristics have been reported by Rubenstein, Radnor, et al. [10], [9], [11]. Major conclusions that can be drawn from their works are as follows. 1) OR/MS leaders can be divided into two major types, viz., profession oriented and organization oriented. The authors concluded that in the missionary phase the former type emerged but, as the activity approached maturity on the American scene, the latter type took over. Further, it was claimed that in the maturity phase, the profession oriented leader re-emerged. 2) In the past, organization oriented leaders were more successful than profession oriented leaders

Environment in Which OR/MS Groups Operate

It seems worth noting, at this point, some of the cultural environment peculiar to Japanese business practice: This should help the reader comprehend the results of this study and make possible an intelligent comparison between Western environment and Japanese environment and the interaction with other observations [3], [20].

Perhaps one of the most distinctive characteristics of Japanese business practice is its life-time employment system. The majority of people do not change jobs from company to company. This characteristic affects the behavior of OR/MS personnel as well as any other employees. Employees tend to think of their career from a long term perspective knowing whatever they do now will affect them in the future. Perhaps stemming from the above, generalists are more favored than specialists in Japanese organizations. Constant rotation from position to position is common and drastic change in task is not uncommon. One may be transferred from an OR/MS position to the line organization which might have been a former client. The reverse also takes place. Thus, people need to be more loyal to their company than to their profession. Readers may wonder how OR/MS skills or any other professional skills can be maintained or up-graded. Herein lies another characteristic of Japanese business practice, viz., extensive training programs are almost inevitable in all areas of the business. OR/MS training is no exception. In addition to the external training institutions which provide both appreciation courses for line managers and specialist training courses for OR/MS personnel, there are frequently company-wide OR/MS training programs for both line and staff personnel.

One of the other noteworthy distinctive characteristics of Japanese business practice that goes along with the life-time employment system is the seniority dependent promotion system. One's position and salary level in an organization are mainly determined by age, number of years served for the organization and the educational background, but not much by how capable one is or what one does. Thus, it is not uncommon that there are only minor differences in promotion among employees of the similar background. This continues up to the time one approaches the executive level at which the differentiation begins to take place. OR/MS leaders are sometimes selected on the basis of the seniority.

The Objective And Method Of The Study

The intention of this study is to examine the personal characteristics of OR/MS leaders which may be considered as affecting the successful survival and promotion of OR/MS activities at each of the previously defined five phases of organizational evolution, with emphasis on the middle three.

A preliminary study consisted of interviewing OR/MS leaders and past leaders at ten companies in order to identify potential factors. This was done by showing them a list of factors compiled from a literature survey (and past survey experience) and asking them to identify the ones which they thought to be the important personal characteristics necessary for OR/MS leaders at each given stage of OR/MS group development. They were also asked to add any important characteristics not on the list. Eventually the list was narrowed to the following fifteen factors:

FACTORS

<u>Code #</u>	<u>Key Word</u>
<u>Organizational Factors:</u>	
1. Persuasiveness with top management	Persuasion
2. Diplomatic and negotiative ability	Diplomatic
3. Concern for communication with line managers	Communication
4. Orientation toward judgement from a company-wide viewpoint	Company-wide
5. Directive ability to orient and guide OR/MS organization	Directive
6. Ability to coordinate group and project members to achieve goals	Coordination
7. Favorable attitude to reflect the opinion and views of subordinates	Subordinates
8. Knowledge of informal and political information within company	Political
<u>Professional Factors:</u>	
9. Enthusiasm and interest in projects	Enthusiasm
10. Ability to make choices in project selection	Selection

11. Ability to estimate project program requirements and results	Estimation
12. Technical skill	Technical
13. Ability to identify problems and evaluate the difficulties	Problem
14. Positive attitude toward new knowledge	Knowledge
15. Creativity and imagination	Creativity

The fifteen factors were divided into two groups in terms of their orientation. viz.: 1) Concern for human relations, and 2) Professional skill in carrying out the mission as an OR/MS group leader.

In the actual data collection stage, items which were not in the above list but which were considered by the interviewees to be relevant were also recorded under the category of "specified other items".

In this study, the process of organization change, or integration of OR/MS group, was viewed as a life cycle process as previously described, with the first and last phases being omitted from the study because leaders do not seem to exist in these phases. The definitions of the three phases of the life cycle used in this study were, as presented in [16], as follows:

Phase I:
(missionary)

A period in which explicit efforts are made by management scientists or others to organize and promote OR/MS activities. Management has made a short term commitment to grant a "charter" to perform OR/MS work only with respect to a specific project or program. The most popular mode of such activity takes the form of a committee being organized and guided by an OR/MS group.

Phase II:
(transitional)

A period in which formally sanctioned units are doing OR/MS work for a variety of clients in the organization and receiving feedback on the results of their efforts. The management has indicated an intention of using OR/MS in the decision making process of the organization. While OR/MS is not yet taken for granted as a permanent organizational activity, there is no time limit on its charter.

Phase III: A period in which a well defined set of activities
(maturity) and applications has emerged for the unit to work
upon. Management has accepted the OR/MS group or
function as a permanent part of the organization.
The time horizon for the commitment of resources
and acceptance of OR/MS as an essential part of
the decision making process approaches infinity.

Companies selected for this study were all those known from our past survey to have OR/MS groups which had already reached the third phase. Industries and the number of organizations covered were as follows:

Petroleum	7
Iron & Steel	4
Textile	3
Chemical	2
Foods	2
Electric	2
Transportation	1
Construction	1
Bank	1
Vehicle	1
<hr/>	
10 industries	24 companies

Forty-two leaders and past leaders out of the twenty-four companies were interviewed. Forty responses were valid in terms of the reliability in the data obtained. The break-down of their positions at the time of study is as follows:

Directors and department managers	7
Acting department managers	2
Section chiefs	13
Acting section chiefs	5
Personnel below the above	13
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Each leader was asked to select and rank the top six factors which he believed to be necessary characteristics for OR/MS group leaders to operate effectively, in order of perceived importance for each of the three phases.

Organizational vs. Professional Factors

A comparison was made between weighted scores (see Appendix) of Organizational Factors and Professional Factors at each phase. Figure 1 shows that OR/MS leaders view that Organizational Factors and Professional Factors were equally important in the initial stage but, they view Organizational Factors much more important than Professional Factors as OR/MS groups advance to the phases II and III in the growth of the group.

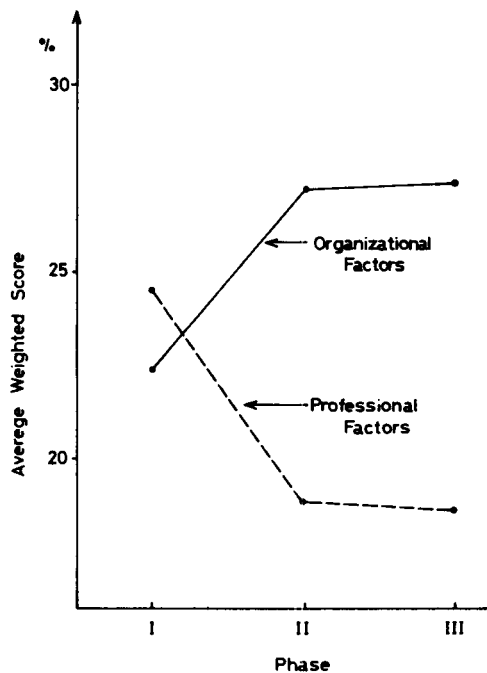


Figure 1 Importance of Organizational & Professional Factors by Phase

The drastic change in the relative stated importance of the two factor groups between phase I (missionary phase) and phase II (transitional phase) suggests the existence of either significant differences in environment between the two phases or insignificantly differing perceptions. In fact, speaking from our observations, there have been considerable number of OR/MS groups which did not reach phase II but died away, or when they reached phase II, had

a very low activity level and/or had much trouble with the clients. The primary reason for the above was often considered to be that the leaders who were very able in phase I and contributed greatly to the establishment of a formal organization did not change or did not change their style in phase II and therefore did not operate effectively. Hence, those in phase II have either been changed or have learned, i.e., the data may reflect change in perception as much as (or more than) change in requirements related to environment.

Declining vs. Growing Factors

A closer look at the average score of each factor in each phase reveals that there are both declining and growing factors in their importance among the Organizational Factor and Professional Factor groups. Figure 2 shows three groups of factors which have declining, growing and steady trends in importance. Those factors which have declining (or growing) patterns are the ones which are considered from the leaders' point of view to be important in the initial informal (or later) stage but not so at the later (or initial) stage. The Declining Factors seem to be related to extrovert attitude of OR/MS leaders which is rather innate and shown by the high degree of their orientation toward innovation and the Growing Factors to the ability of internal control which requires considerable amount of experience.

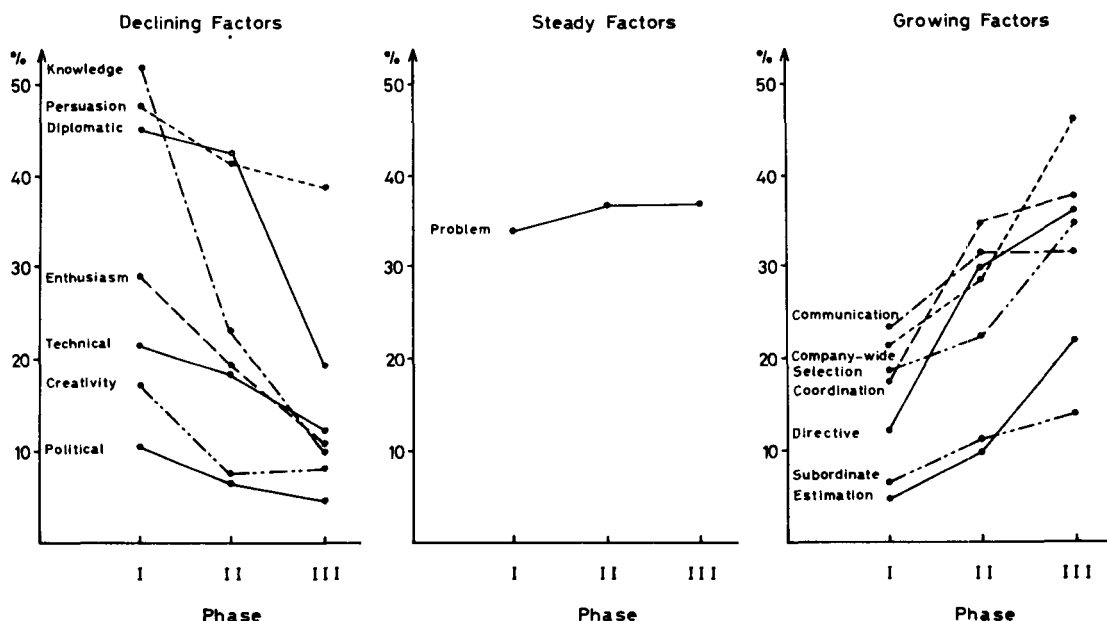


Figure 2 Change in Importance of Factors by Phase

One explanation from Table 1 suggests that in the initial stage it is important that the leaders having been given little organizational authority in the Japanese environment have had to establish themselves or their groups in the organization by demonstrating innovative skills and thus gaining a top management support. Therefore, the skill to solve an OR/MS problem is seen more important than organization control skill except with respect to top management relations. The reason for the special emphasis upon top management relations can be explained, from our observation, as follows. The leaders who are interested in theoretical world and strong orientation toward innovation and techniques are, in reality, also likely to have a tendency to be dogmatic thus not conforming to the organizational norms. Such leaders tend to cause trouble with clients and top management. Therefore, maintenance of good relations with them, especially with the latter, was seen vitally important for the successful survival in the initial stage [10], [12]. An alternative explanation is that in the early phase fewer leaders realize the importance of organizational as compared to innovative skills. As the group gained organizational recognition and reached that last phase of institutionalization, management of the group activity is seen to be a more needed characteristic of the leaders.

Table 1 Grouped Factors by Trends

	DECLINING FACTORS	STEADY FACTORS	GROWING FACTORS
ORGANIZATIONAL FACTORS	1. Persuasiveness with top management 2. Diplomatic and Negotiative ability 8. Knowledge of informal and political information within company		4. Orientation toward judgement from company-wide viewpoint 6. Ability to coordinate group and project members to achieve goals 3. Concern for communication with line managers 5. Directive ability to orient and guide OR/MS organization 7. Favorable attitude to reflect the opinions and views of his subordinates
PROFESSIONAL FACTORS	14. Positive attitude toward new knowledge 9. Enthusiasm and interest in projects 12. Technical skill 15. Creativity and imagination	13. Ability to identify problems and evaluate the difficulties	10. Ability to make choices in project selection 11. Ability to estimate project program requirement and result

The relative perceived importance of each factor among the group of factors at each phase was also examined by ranking the factors for each phase and grouping them into four categories as shown in Table 2. From the table, it can be noted that factors Persuasion, Problem and Communication were evaluated to be of relatively constant importance regardless of the phase. Out of the there factors cited above, factors Persuasion and Communication are organizational factors which were studied by Radnor and Beam who found that "top management support" [12] and "client receptivity" [2] were important factors for the successful OR/MS activities.

Table 2 Grouping by Relative Importance

Category Name	Key-worded Factor	Average Rank	Range
Stable Top	Persuasion	2.0	0
	Problem	3.3	1
	Communication	6.0	2
Important at Initial Stage	Diplomatic	4.3	6
	Knowledge	7.3	12
	Enthusiasm	9.0	7
	Technical	9.7	4
Important at Later Stage	Company-wide	5.3	7
	Coordination	5.7	7
	Directive	7.7	7
	Selection	8.0	3
	Estimation	12.0	7
	Subordinate	12.0	4
Stable Bottom	Creativity	13.0	3
	Political	14.3	2

Effect of Leader's Background

As was mentioned earlier the subjects from whom the data were collected were a mixture of leaders and past leaders of OR/MS groups. Thus it seemed worth investigating any possible differences in opinions between older leaders or past leaders who had experienced the difficulties in initiating OR/MS activities in their organizations and the younger leaders who succeeded the pioneers. Out of the 40 data sources, 31 subjects were selected to fit to either one of the following two definitions.

Pioneer Group (PG): Leaders who had experienced OR/MS work before it was formally recognized or who took the responsibility of initiating and/or managing the first OR/MS group and had since maintained contact with OR/MS. (N = 17)

Successor Group (SG): Leaders who were not involved in the initial stage of establishing the OR/MS group but succeeded their predecessors after the group gained a relatively firm organizational position. (N = 14)

Nine subjects were omitted from the analysis on the basis of difficulties in differentiating them. The above classification was found to correspond to a certain extent to the definition of "professional" and "organizational" leaders by Radnor et al. [10], [11].

In order to see the similarities and differences in opinions between Pioneer Group and Successor Group, the differences between the average scores of the two groups at each phase, for each factor, were computed and are shown in Table 4 (see Appendix).

As will be seen in Table 4, generally speaking the Successor Group rated relatively higher than the Pioneer Group on the factors falling into the declining category and rated lower in the growing category (Table 1). The hypothesis of independence (using the total score in Table 4) was rejected at 5% significance level as a result of one-sided Mann-Whitney test. The Pioneer Group seemed to place a heavier emphasis on client relations while the Successor Group seemed to view the ability to handle strategic problems as more important. In other words, the Pioneer Group seemed to be more concerned with the internal control and the Successor Group seemed to be more interested in external relations task. This seems to show the learning effect which was mentioned in the previous section.

Among the factors which showed significant difference in average scores between the Pioneer Group and the Successor Group, factors Persuasion, Diplomatic, Communication, Company-wide, Enthusiasm, Problem and Creativity were especially noteworthy.

Conclusions

We have investigated changes in the desirable personal characteristics of OR/MS group leaders as the groups progress through their organizational evolution. The assumption was made that 1) the process of the integration of OR/MS activities is understood as a life cycle model; 2) the effectiveness or success of OR/MS groups depends very much upon the personal characteristics of OR/MS group leaders; and 3) the fitness of OR/MS group leaders depends upon the organizational climate under which OR/MS groups are operating.

Although these assumptions are not necessarily self-evident and not the ones on which common agreement is reached by all, the principal argument here is that the requirements on the personal characteristics of OR/MS leaders change as the OR/MS groups grow in the organizations. Among the respondents in our study who have actually taken the responsibility as the leaders, considerable degree of agreement with the opinions on the above argument was noted. This argument has not necessarily been made clear by the OR/MS critiques or organization theorists. The method of study used here solely depended upon the subjective judgement of the respondents, but the shift in this judgement are themselves of some interest and importance.

The result of this study cannot directly be compared with the conclusions of previously mentioned U.S. studies. Under the life time employment and seniority dependent promotion system, distinctive OR/MS leader patterns are difficult to identify in the Japanese environment. Hence the importance of studying the perceived and required personal characteristics of leaders was confirmed.

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Appendix

Table 3 is the summary of data obtained from the interviews. Responses given to the category "Specified other items" were so varied with so few responses for each classification that these data were omitted from the table. The hypothesis of randomness in responses in each phase was rejected at 1% significance level as result of χ^2 test.

For the purpose of analyses, various weighting schemes were tried and the following scheme was employed. Linear weight was given to the top six factors selected, viz., 6 to the first rank, 5 to the second and so on giving zero weight to the rest. The weighted sum was divided by the highest possible score of 6 x N where N is the number of samples (240 in the case of N=40) to obtain a meaningful comparable set of numbers.

$$WS_i = \frac{\sum_{j=1}^6 W_j X_{ij}}{6N} \times 100$$

where

WS_i : Weighted score for the i-th item in percentage
(i = 1, 2, ----, 15)

X_{ij} : Number of responses given to the j-th rank
for the i-th item
(j = 1, 2, ----, 6)

W_j : Weighting factor for the j-th rank
(= 6-j + 1)

Table 4 shows the differences in the average scores between Successor and Pioneer Groups.

Table 3 Frequency Distribution of Responses

Rank		N _Q							Weighted Score
Phase	Factor Code	#1 (x6)	#2 (x5)	#3 (x4)	#4 (x3)	#5 (x2)	#6 (x1)	Rating (x0)	
PHASE I (Missionary)	14	9	5	4	3	4	4	10	50.4
	1	8	4	6	5	2	1	14	46.7
	2	4	6	7	4	3	5	11	43.8
	13	6	3	2	2	5	4	18	32.9
	9	2	5	1	6	2	5	19	28.3
	3	2	2	2	5	3	2	24	22.1
	12	1	4	2	3	3	2	25	21.3
	4	3	3	2	0	3	3	26	20.8
	10	1	2	2	2	5	3	25	17.9
	6	1	1	3	4	3	1	27	17.5
	15	2	3	2	1	0	2	30	16.7
	5	1	0	3	2	1	1	32	11.3
	8	0	1	2	1	2	5	29	10.4
7	0	0	1	1	3	1	34	5.8	
11	0	0	1	1	1	1	36	4.2	
PHASE II (Transitional)	2	7	6	4	1	3	2	17	41.3
	1	9	3	3	2	3	4	16	40.4
	13	7	3	3	2	4	3	18	35.8
	6	2	5	3	6	5	3	16	33.3
	3	3	5	3	3	3	1	22	29.6
	5	3	3	4	3	3	5	19	28.8
	4	2	6	3	2	1	4	22	27.5
	14	2	1	4	3	4	3	23	22.1
	10	2	1	3	5	2	4	23	21.7
	9	2	1	2	3	4	2	26	18.3
	12	0	2	4	1	6	2	25	17.9
	7	0	1	2	3	0	3	31	10.4
	11	1	1	1	1	1	2	33	9.2
	15	0	1	0	3	1	1	34	7.1
	8	0	1	1	2	0	1	35	6.7
PHASE III (Maturity)	4	4	6	7	4	4	4	11	44.2
	1	5	7	4	1	3	1	19	37.9
	6	6	2	4	5	3	3	17	35.8
	13	0	3	1	1	4	2	20	35.8
	5	6	5	2	3	3	1	20	35.4
	10	3	4	2	8	4	3	16	33.8
	3	2	5	5	2	4	1	21	30.0
	11	1	2	3	2	6	4	22	20.8
	2	1	1	4	4	1	4	25	18.8
	7	0	2	1	3	3	2	29	12.9
	12	0	1	1	2	4	5	27	11.7
	9	1	1	1	3	0	1	33	10.4
	14	0	1	2	2	1	3	31	10.0
	15	2	0	1	0	1	2	34	8.3
	8	0	0	2	0	0	3	35	4.6

Table 4 Difference in Average Scores between Successor Group and Pioneer Group

Average Score (SG) - Average Score (PG) (%)									
Phase						Total		Total	
I		II		III					
Factor Code	Score	Factor Code	Score	Factor Code	Score	Factor Code	Score	Factor Code	Score
15	17.23	1	26.61	2	11.28	1	45.73	4	65.06
2	16.24	9	24.51	4	11.21	15	34.03	3	52.04
13	12.46	14	14.08	1	9.10	2	20.52	9	46.63
1	10.02	15	11.55	6	8.54	6	20.16	1	45.73
9	8.05	6	3.92	10	6.86	14	18.56	13	42.71
6	7.70	7	-0.84	11	6.72	9	18.49	2	34.52
14	7.14	8	-1.68	15	5.25	7	4.90	15	34.03
7	2.03	12	-2.52	12	4.48	11	-5.11	14	23.88
5	-1.26	13	-6.44	7	3.71	10	-8.47	10	22.19
11	-3.29	2	-7.00	8	2.03	8	-9.38	12	21.00
10	-6.30	5	-7.78	14	-2.66	12	-12.04	6	20.16
8	-9.73	11	-8.54	5	-6.86	5	-15.90	11	18.55
12	-14.00	10	-9.03	9	-14.07	13	-17.79	5	15.90
3	-19.33	3	-9.95	3	-22.76	4	-42.64	8	13.44
4	-26.96	4	-26.89	13	-23.81	3	-52.04	7	6.58