

COOPERATION AND OPTIMAL STRATEGIES IN COOPERATIVE ORGANISATIONAL GAME

Abdumalik Djumanov¹

¹Pharmaceutical Technical University, Tashkent, Uzbekistan

DOI: <https://www.doi.org/10.56726/IRJMET53938>

ABSTRACT

The research paper examines behavioral aspects of the organizational change process as a repetitive game. Organizational behavioral transactions are mathematically modeled used a game theory approach. The research models leader's and followers' strategies and their outcomes. Understanding game pay-offs for various strategies of a leader and employees, preferred actions were proposed and leader's optimal strategy under organization equilibrium is suggested. The research paper is based on mathematical narrative.

1. INTRODUCTION

People and their organizations exist in a world of continuous evolutionary activity. The contemporary environment of unprecedented uncertainty and chaos surrounding organizations sets new criteria for their functioning. Fierce competition and the harsh conditions of survival in a globalizing marketplace, stricter social and environmental requirements, an unpredictable political situation, the threat of terrorism, the growing gap between the GDPs of the richest and poorest countries, unstable financial markets, tightening legal frameworks, and growing customer demand for alternatives, superior quality, and convenience, on the one hand, and the technological revolution, global telecommunications services, a record number of mergers, acquisitions, joint ventures, and cooperations, the globalization of business and its financing, and international economic and trade regulations, on the other – these are the realities of the contemporary organizational environment. These factors are interconnected and rapidly changing, creating a highly uncertain and chaotic environment for all types of organizations in manufacturing and service industries, as well as in the public and private sectors (Zojgani & Raci, 2015). Organizations that want to grow must constantly change to adapt to such a turbulent environment. "They evolve and change in many ways. Their structures, missions, purposes, and activity levels are critical elements of this process. Outdated structures, purposes, missions, and activities indicate the need for change and, perhaps, a transition to new forms and/or systems" (Korth, 1998).

2. METHODOLOGY

The research article discussions are based on inductive reasoning using game theory mathematical narrative and logical reasoning.

It is assumed that players of the behavioral game, organizational members may behave differently facing change interventions, and consequently projected changes in productivity are not met in full capacity. The aim of this work to examine of the economic nature of behavioral transactions in change process to develop instrumental basis for simulation of change process as a behavioral game, and to determine possible outcomes of the process under various circumstances. Analytical evaluation of strategy options and management styles is an imperative to anticipate desired outcomes.

The comprehension of mutual consensus as an optimal strategy of planned change is vital. Consensus of the change game participants is to contribute to the organizational equilibrium with the highest organizational net growth. Cost of consensus, and impact of change parameters alterations to outcome and state of an organizational equilibrium are important information for planned change management.

Advantage of altruistic behavior particularly in change process is to be proved, and benefits of reciprocity instead of delusion will be focused. Comparative analysis of various altruistic objectives is used to make necessary conclusions. Economic analysis of behavioral transactions is also used in the work.

Discussions

The followers, employees of an organization, have also their own objectives and alternative strategies in participation in a new change process, moreover they even may decide to avoid such participation. As employment contracts, signed before announcing a change, usually expect extra efforts from employees for the benefit of an organization. In contemporary legal environment, it is sometimes difficult to oblige people for additional effort to overcome resistance to change. Therefore, it is very important to consider both parties incentives, otherwise the leader becomes very selfish. Only an ideal and perfect change implementation may reward all participants with maximum available pay-offs that each party has separately expected, however

such cases happen very rarely in real practice, i.e. are almost improbable. A successful altruistic leader weighs up an organization's benefits and the followers pay-offs from change implementation to make everyone 'satisfied' with change outcomes or, say also, to establish an organizational equilibrium by means of optimum consensus.

Let's consider simple case, a change process is a game: the leader establishes certain new work norms and incentives to motivate the followers to cooperate in this game accepting new conditions and performing honestly. However, due to individuals' behavioral diversity, each follower has his/her own personal perception of the incentive amount – 'enough to be happy', 'enough to sustain' or 'not enough to be engaged' in change process, and individual's expectations and actual performance may diverge as well. Most of the people tend to overestimate their own performance level, and accordingly overprice own cost of effort. Thus, some individuals in organization may find established change incentives undervalued and take a position of 'free-riders' demonstrating solidarity but doing no effort, even cheating to gain some additional incentives, which can unfortunately exist. The 'free-riders' problem emphasizes impossibility of voluntary cooperation in such games (Collard, 1981). As individuals may have their own cost of effort or expectation of incentives, individuals' decision either to cooperate or avoid cooperation depends on exposed level of incentives or pay-offs. A simplified game of cooperation in change process can be modeled with well-known 'prisoner's dilemma' with two available strategies – cooperate (C) and not cooperate (N) (Rasmusen, 2001). Assuming that both parties have symmetrical gains/losses in a game the following table of pay-offs is obtained:

Table 1. Pay-offs matrix for a change cooperation game.

	Leader		
	Strategies	C	N
Followers	C	CC, CC	CN, NC
	N	NC, CN	NN, NN

Here the followers get a gain, NC, if leader cooperates in change offering incentive scheme, and the followers do not cooperate following free-rider's behavior. Non-cooperation of the leader means that he/she initiates a change process but does not reward cooperation efforts of the followers.

In this case, preferred strategy of the followers is determined by relative sizes of incentives, and it is obvious that:

Free-rider NC > wholly cooperative CC > wholly non-cooperative NN > simpleton CN. (1)

As inequality (1) demonstrates, the followers under selfish behavior tend to slack the cooperation, and assume that other followers also choose non-cooperative strategy. Following prisoner's dilemma, in the first round the followers may not cooperate as free-rider's or wholly non-cooperative pay-offs are better than simpletons' one. In the next round, the followers may again follow the non-cooperative strategy hoping to be a free-rider again. If the leader following altruistic behavior cooperates in the first attempt honestly and loses because of the cost of his/her change efforts. In next rounds, the leader may also follow selfish behavior trying to avoid losses caused of non-cooperation of the followers, and chooses non-cooperation strategy too. Thus, change process is baffled due to total non-cooperation under selfish behavior of parties, and absence of the mutual trust; however the complete cooperation strategy, Pareto dominance, is definitely better than complete non-cooperation for both parties. Repetition of this game brings to the same outcome – mutual non-cooperation, hence real pay-offs prevail over any rhetoric which ascertains utter certitude. In order to enforce change process, the altruistic leader must convert 'prisoner's dilemma' into assurance game, known also as "the Tender Trap" or Ranked Coordination game (Rasmusen, 2001), convincing the followers to cooperate that the followers' cooperation is better than temptation of free-riding, i.e. establishing ration (wholly cooperative CC > free-rider NC), and maximizing incentives for cooperation.

Learning a deal about human behavior is beneficial. It should be mentioned here a useful distinction between super-game and dynamic game (Rapoport & Chamman, 1965). A super-game is just a game, which is repeated a lot of times without the change of preferences while in a dynamic game outcome of any one game affected by what happened in previous games. Continuous repetition of the game within the same group of players, and sharing the information increases cooperation, and consequently develops the static super-game to a dynamic game in which each player evaluates partner's behavior, and decides on future strategies.

On the other hand, cooperative and competitive games, such as prisoner's dilemma, cannot explain human behavior ignoring psychological factors of individuals (Eiser, 1975). Although communication between players has a favorable affect on cooperation, people are quite happy to behave in egotistic way whilst the justice and fairness are not imposed.

To find necessary level of incentives for converting competitive game stance into assurance game of cooperation in change

process, we will consider more practical case with extended strategies. It is assumed that an individual who does not cooperate is not involved in other games, so number and composition of followers do not change during change intervention. The followers may have a set of strategies consisting of three options {honest cooperation; destructive cooperation; non-cooperation} which is a more realistic case when some individuals with selfish behavior within organizations may quite destructively participate in change process. The leader is also engaged in change process with a set of behavioral strategies {enthusiasm; reluctance} as destructive cooperation of the leader is unacceptable even for very selfish leader too; however it is not occasional. Reluctance strategy of the leader is an unwillingness of a manager to implement change process due to individual behavioral attributes or personal incentives.

Such situation can be compared with the game of trading parties where it is assumed that the followers make effort dispatching their goods, efforts, and the leader rewards efforts made paying for arrived goods (Casson, 1991). Likewise, the leader may also pre-pay some amount of reward for goods and efforts, and expect the receipt of them. Reluctance of the leader can be compared with the situation when trader is in receipt of goods but does not pay the whole contract amount or at all. As in the case of prisoner's dilemma, the altruistic leader will try to influence the game so that pay-offs of the followers for cooperation is preferred to other strategies, and in the latter case, he encourages trading partner to be honest establishing certain game pay-offs.

To understand game in change implementation process, we consider a case: a company needs to implement a change due to certain circumstances, and consequently delivers expenses paying the amount of, $C > 0$, to OD practitioners for diagnosing an organization, and developing action plans. By implementation of successful change, an organization expects to gain additional growth of production performance output, ($\Delta y > 0$). Of course, as any planned change, this change implementation also necessitates organization members, followers, making an additional effort with perceived cost of $\varepsilon > 0$ to overcome resistance to change. The cost of this effort as a rule, exceeds projected growth, ($\varepsilon > \Delta y$). Management of an organization is the leader of change process. Although a separate game situation may take place within management team which is out of our scope, they will be considered as one player with the single altruistic incentive. To encourage followers the leader establishes additional motivation consisting of material incentives, α , and intrinsic incentives, τ , such as promotions, empowerment, recognitions, improving quality of the work life etc. (Table A4), and $(\alpha + \tau) > 0$. Nevertheless negative aspects also exist, diagnosis of an organization reveals the fact that corporate disobedience rate, $0 \leq \chi \leq 1$, is associated with incentives to cheat, $\beta > 0$, and the case of mutual cheating may reduce incentives of the followers to the amount of, δ , which is even more damage of the credibility of an organization.

In this context, parameters of this game can be illustrated as in Figure 4.1. However it must be noted that these parameters may have arbitrary relationship different than this.

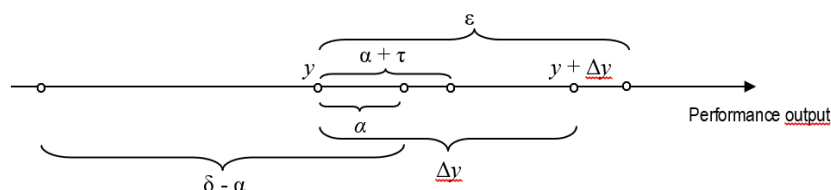


Figure 1. The disposition of parameters in the change implementation game.

The followers honestly cooperating in change process may gain an additional incentive paying an effort if the leader is enthusiastic of change, or they get only material incentive paying an effort, and lose the amount of cheating because of the leader's cheat, and reluctance to motivate them morally. When the followers cooperate in change honestly, an enthusiastic leader acquires a performance growth, the followers' effort, and moral satisfaction commensurate with the followers' one, and paying material incentives. When the followers are honest, a reluctant leader also achieves the growth of performance, furthermore he gains additional incentive to cheat as he is not over-performing while the followers do, however he/she may experience discomfort (if the leader is not too selfish).

Some individuals may prefer the status of 'free-riders' gaining both material reward for participation, and additional incentive for cheating the enthusiastic leader, however such behavior comes with sense of quit. If the enthusiastic leader is cheated his/her expected outcome lessens at the amount of cheat incentive and material incentives offered for the followers.

Cheating a reluctant leader the followers do not acquire moral discomfort but material loss while a reluctant leader also loses the amount presumably exceeding expected growth but keeps back material incentives not rewarding the followers' dishonesty.

Voluntary participation in change process was a precondition of our game situation. If the followers decide not to be 'entangled' in change implementation game their pay-offs are zero, and consequently performance growth is not met. In this situation, the enthusiastic leader loses effort of the followers while his reluctance does not involve such cost.

Individuals' perception within organization is not homogeneous or the followers' behavior is not perfect collectivistic so that they would all without exception follow only one strategy. To identify probability of choice, game theorists deploy so called 'perceived probability' or 'assigned value' coefficients for estimating probability of certain strategy choice. In our case, it would be more appropriate to associate such probability of choice with organization's disobedience rate. It is apt to an individual follower as well as a group of followers. In the former case, disobedience rate can be considered as an approximated probability of randomly sampled individual's choice of dishonesty while this rate serves as an estimated contingent of group members tend to disobey in the latter case.

It should be noted that in all situations except mutual cheating the leader, despite of his behavior, bears an initial cost of change development. In the light of these discussions, pay-offs matrix of the change implementation game is obtained as illustrated in Table 1.

Table 1. Change implementation game pay-offs matrix.*

	Strategy	Leader	
		Enthusiastic	Reluctant
Followers	Honest cooperation	$\alpha + \tau - \varepsilon; \Delta y + \tau + \varepsilon - \alpha - C$	$\alpha - \varepsilon - \beta; \Delta y - \alpha + \beta - \gamma - C$
	Destructive cooperation	$\alpha + \beta - \gamma; \Delta y - \alpha - \beta - C$	$\alpha - \delta; \Delta y + \alpha - \delta$
	Non-cooperation	$0; -C - \varepsilon$	$0; -C$
	Perceived probability of the leader's choice by the followers	$1 - \chi$	χ
* Pay-offs (Followers; Leader)			

To convert this game from 'prisoner's dilemma' to 'assurance' game the leader has to understand game outcomes, and to manage inputs. To do this the change process game is to be analyzed from the point of view of the followers.

If overall reward for honest cooperation of the followers exceeds incentive for cheating, $\alpha + \tau - \varepsilon > \beta$, the followers preferred strategies are determined from level of incentives:

$$(1-\chi)(\alpha + \beta - \gamma) > (1-\chi)(\alpha + \tau - \varepsilon) > 0 > \chi(\alpha - \delta) > \chi(\alpha - \varepsilon - \beta) \quad (2)$$

or

'free-rider' while the leader is honest > mutual honest cooperation > mutual avoidance > mutual cheating > simpleton

The above inequality (2) states that if reward exceeds cheating incentive, all followers would participate in change process either honestly or destructively while the leader is enthusiastic, otherwise a game is stuck in mutual avoidance as the followers do not prefer mutual cheating or being simpletons. But on the other hand perceived probability of the leader's honesty or say trust in leader's honesty, and guilt factor of individuals may dramatically change preferred strategies of the followers.

Assuming material and emotional incentives are additive, the altruistic economic leader considers the following payoffs (see Table 2):

Table 2. The incentive pay-offs in change interventions per the followers' strategy choice.

Strategy	Rewards
Honest Cooperation	$y + \Delta y - E - C$
Destructive Cooperation	$y - C - \gamma$
Non-cooperation	$y - C$

Given incentives being similar, the followers prefer the most positive in terms of ethics strategy, the disposition of incentives for an appropriate change climate will be as

$$y + \Delta y - E - C \geq y - C - \gamma \geq y - C.$$

Hence change intervention outcomes are positive if

$$\begin{cases} \gamma \geq E - \Delta y; \\ \Delta y \geq E. \end{cases}$$

Referring to the above equation it is can be stated that

- honest cooperation is preferred instead of non-cooperation if

$$\chi \leq \frac{(\alpha + \tau - \varepsilon)}{(\tau + \beta)}; \quad (3)$$

- non-cooperation is preferred instead of destructive cooperation if guilt factor

$$\gamma \geq \beta + \delta + \frac{(\alpha - \delta)}{(1 - \chi)}; \quad (4)$$

- honest cooperation is chosen instead of destructive one if guilt factor improved to

$$\gamma \geq \delta - \tau + \frac{(\delta - \beta - \varepsilon)}{(1 - \chi)}. \quad (5)$$

Above weak equalities mean that the followers prefer to choose more positive behavior if equal options are given.

In accordance with (3), preference of honest cooperation in a set of strategies {honest cooperation; non-cooperation} does not change as it is independent of individuals' guilt factor, γ , however this ratio is also very closely associated with so called 'level of trust' in the leader. It should be noted that material incentive influences disobedience rate rather than intrinsic incentive. This confirms HRM theory on motivation which says that affect of intrinsic incentive lasts longer than extrinsic but the latter has higher motivational effect however. In spite of it, the effective leader knows how to enrich the work of the followers to increase intrinsic motivation, for example, with vertical job loading (Bennet, 2015).

Inequalities (4) and (5) exhibit that in the given level of trust in the leader or in given intensity of the leader's manipulations, μ , required guilt sense to sustain honesty is affected by the factor $1/(1-\chi)$. In its turn factor disobedience is also conversely related to intensity of manipulations. It is also notable that intrinsic incentives may dramatically change the followers' behavior in the choice of honesty from cheating. Thus, the leader increasing manipulations may improve followers' behavior in terms of guilt factor.

The altruistic leader tends to fulfill the first inequality motivating followers to cooperate honestly in a game increasing his own trustworthiness in order to reduce disobedience rate, and consequently obtains various strategy options, and change outcomes in 'guilt factor – rate of disobedience' space as shown in Table 4.

Table 4. Conditions for identification of the followers' strategy space, $\gamma = f(\chi)$.

Strategy	χ condition	γ condition
Honest cooperation (H)	$\chi \leq \frac{\alpha + \tau - \varepsilon}{\tau + \beta};$	$\gamma \geq \beta + \delta + \frac{\alpha - \delta}{1 - \chi};$
Destructive cooperation (D)	$\begin{cases} \chi \leq \frac{\alpha + \tau - \varepsilon}{\tau + \beta}; \\ \chi > \frac{\alpha + \tau - \varepsilon}{\tau + \beta}; \end{cases}$	$\begin{cases} \gamma < \beta + \delta + \frac{\alpha - \delta}{1 - \chi}; \\ \gamma < \delta - \tau + \frac{\delta - \beta - \varepsilon}{1 - \chi}; \end{cases}$
Non-cooperation (N)	$\chi > \frac{\alpha + \tau - \varepsilon}{\tau + \beta};$	$\gamma \geq \delta - \tau + \frac{\delta - \beta - \varepsilon}{1 - \chi};$

Change implementation process is a continuous game. Involved parties may change their strategies according to the game outcomes, and partner's previously chosen strategy. The start of change implementation or the first attempt of the game is important as it gives an opportunity to evaluate partner's behavior, and establishes the mutual level of trust. At the given level

of the leader's manipulations, probability-dependent incentives space is graphically illustrated as in Figure 2, in typical case, when

$$\delta \geq \alpha + \tau \geq \beta \geq \varepsilon \geq \Delta y \geq \alpha \geq \tau \geq 0. \quad (6)$$

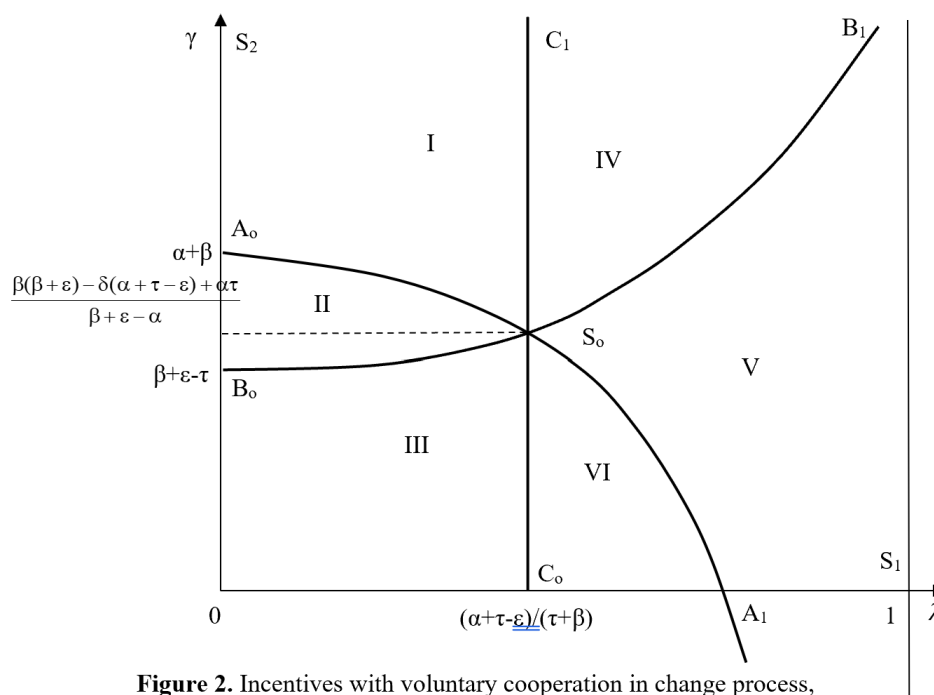


Figure 2. Incentives with voluntary cooperation in change process, here $\delta \geq \alpha + \tau \geq \beta \geq \varepsilon \geq \Delta y \geq \alpha \geq \tau \geq 0$.

In this case, $\gamma = f(\chi)$ space is divided into six parts. Each of them represent certain game outcome with an appropriate strategy, and their size vary depending on values of game parameters, α , β , δ , ε , and τ . Change in the disposition of these game parameters dramatically changes nature, and shape of these strategy spaces, as well as number of available strategies. None can argue that some combinations of game parameters, or change incentives and the cost of desired effort, will make change implementation impossible. It is very important but it beyond the theme of this study. Therefore, the deliberation of the typical case (6) should be discussed separately.

Areas I, ($A_0S_0C_1S_2$), and II, ($A_0B_0S_0$), represent the most reliable situations for successful change implementation. In these cases, the followers cooperate honestly in change implementation game as they are assured about the leader's enthusiastic moral system and satisfied with established incentives. Particularly, in the strategy space I, high level of trust in the leader's behavior motivates the followers to change, and cost of guilt also remains high, $\gamma \geq \alpha + \beta$, consequently destructive cooperation involves high moral discomfort. It should be noted that the higher incentives exposed, and lower incentive to cheat the lower is the rate of disobedience or higher the trust in the leader. Honest cooperation of the followers is anticipated more often than not, and avoidance is not beneficial as $\alpha + \tau \geq \varepsilon$. This case can be associated with too altruistic organizational behavior where individuals' objectives precisely match organizational objectives, and people benefit from mutual honest cooperation.

Strategy space II differs from space I, although the trust level is also high, the followers tend to honestly cooperate more because of that the cost of moral discomfort is higher than the cost of effort to change yet less than incentives, $\alpha + \tau \geq \gamma \geq \varepsilon$. Cheating is not economic, $\alpha + \tau > \beta$, but non-cooperation is seductive. Nevertheless, the followers avoiding cooperation in the past can be inclined to honest cooperation at later stages. Both strategy spaces extend further if incentive to cheat is diminished, and the followers' motivation is increased, principally material incentives.

The case III, ($OB_0S_0C_0$), is an interesting strategic option. If the situation is evaluated from economic point of view, some of the followers may cooperate honestly while the others cheat cause of unattractiveness of avoidance. Trust in the leader's honesty is still high, and the followers with higher sensitivity tend to honestly cooperate instead of non-cooperation. As sense of guilt is low, and incentive to cheat is high, some followers may destructively cooperate. Such situation occurs when an organization has financial constraints to offer higher level of incentives due to some circumstances but at the same time the leader has high reputation among employees. Presumably, this is a typical case of organization behavior in developing countries with high power distance, and masculine culture where one can find both within one organization – the dedicated people as well as corrupted. To improve situation the leader needs to increase intensity of manipulation for improving individuals' moral, and thus to minimize destructive cooperation. Rising of intrinsic incentives also lessens the size of this strategy area. However selfish followers may continue cheating, the only way to root out is to dismiss them, and to deploy proper recruitment system.

In the strategic space IV ($S_0C_1B_1$) the followers do not cooperate except very magnanimous ones who may prefer to cooperate honestly because of their belief in integrity. However, trust in the leader's honesty is low so is the followers' sense of guilt. Destructive cooperation is not economic therefore some followers prefer to avoid cooperation while others with superior moral may honestly cooperate. If change intervention game is continuous, unselfish followers avoid honest cooperation because of incentives are less than the cost of effort, consequently total non-cooperation is anticipated, and change process is faded out. Hence change intervention is not favorable, and the leader needs to review reward system to increase the followers' trust in his/her honesty.

Strategy space V, ($S_0B_1S_1A_1$), is worse than previous, and the change is not recommended within such conditions. The followers avoid cooperation as incentives are less than efforts required. If an increase of incentives takes place, it is usually connected with higher rate of demand for effort. Therefore, trust in the leader's honesty is low so is the followers' sense of guilt. Even destructive cooperation is not economic, and the followers prefer to not cooperate hence change process is at a nonplus cause of overall reluctance. Most often such cases happen in organizations where discrimination of labor is favorable, and employee rights are humiliated. To improve situation the leader needs to increase the intensity of manipulations and review the reward system to raise trust and moral of the followers. Maybe the leader in such situation should rise above selfish considerations and adopt an altruistic approach. Otherwise, the situation may develop to the strategy space VI because of incentive to cheat is likely to augment.

It is hard to say whether in conditions of strategy space VI, ($C_0S_0A_1$), organization can sustain only as an exception to the rule. Most of followers destructively cooperate, only some righteous may avoid cooperation, and consequently may resign soon. Trust in the leader's honesty is low so is the followers' sense of guilt. Incentive to cheat is higher than other alternatives thus majority tends to destructively cooperate. Only ethical followers will avoid any cooperation without a prior evaluation of other alternative strategies for selfish climate impels to cheat mutually. Change implementation is harmful as it may split groups, and worsen group moral, and an opposition to dishonesty may soon vanish completely. The leader needs to review overall change implementation policy, however probably he may be a hostage of external environment. Although it is difficult to believe in the existence of the same situations, some externally financed organizations may sink into such situation where everyone seeks for the opportunity 'to snatch' because of a leader and employees are not motivated sufficiently.

In the above we considered the change implementation game from the standpoint of the followers, i.e. employees needing to change their work attitudes accepting new norms. In contrast to this, the chapter III reflects on an economic side of the change process from organization point of view. It would be a naïve way of gaming if the organization management, the leader, on one side, and employees, the followers, on other side were guided by their objectives expecting the maximum incentive. It is obvious that in such situation altruism and cooperation are not qualitative adjectives of the change implementation game. However it may happen when owners of the company, not a manager, and employees have their own projections concerning change outcome and both are reluctant to understand other party's objectives.

Unlike it, an altruistic leader is recommended to maximize the amount of trade incentives humanizing partners to encourage them in a fair trade (Casson, 1991). In this case, an altruistic leader expects reciprocity of a trade partner offering more incentives. However, the change process is a different game in which an organizational equilibrium is more important.

Also the leader adopting utilitarianism can anticipate the growth of both sides' incentives together with effort, and better moral climate. Too much pragmatism may bring huge problems with control and coordination. Therefore, in the light of above discussions, it is more economically rational for the leader, or an assigned manager, to develop organizational objectives in change implementation reducing expected incentives of owners and the followers to a common denominator. The leader maximizes common incentives setting a condition that honest cooperation is to be economically attractive that cheating. In this case, the objective function is

Organizational Equilibrium Gain = $\max_{\mu \rightarrow \infty} (\text{Leader's incentives} + \text{Followers' incentives})$,

hence

$$\varpi_e = 2\tau + \varepsilon - \Delta y - \frac{\varepsilon - \Delta y}{\mu} [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C], \quad (7)$$

or

$$\varpi_e = 2\tau + \varepsilon - \Delta y - \chi_e [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]. \quad (7a)$$

Assuming that the leader positions on the manipulation management style rather than monitoring, and (7), the organizational utility function is written as

$$v_e = \varpi_e - \xi, \quad (8)$$

thus with (7) is

$$v_e = 2\tau + \varepsilon - \Delta y - \frac{\varepsilon - \Delta y}{\mu} [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C] - \xi_f - \xi_v \mu, \quad (9)$$

whereas $\varepsilon - \Delta y > 0$, and $\delta \geq \alpha + \tau \geq \beta \geq \varepsilon \geq \Delta y \geq \alpha \geq \tau \geq 0$.

Following previously used techniques, i.e. equaling the first derivative of (9) to zero, the optimal point of manipulation is obtained as graphically illustrated in the Figure 3.

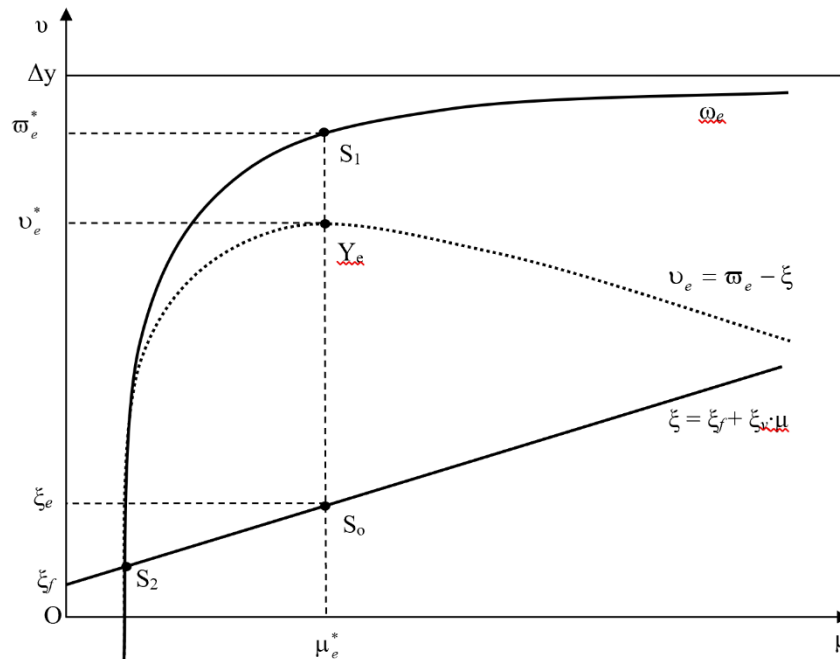


Figure 3. Optimal manipulation under an organizational equilibrium of the altruistic leader.

The negative value of the second derivative of (8) additionally proves that v_e^* is global optimum of the organizational equilibrium in given space, $\mu \geq 0$.

Based on (9), (7a), (8), and (9) the following state parameters of the optimal organizational equilibrium for change implementation are found:

$$\mu_e^* = \left[\frac{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]}{\xi_v} \right]^{1/2}; \quad (10.1)$$

$$\chi_e^* = \left[\frac{(\varepsilon - \Delta y) \cdot \xi_v}{3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C} \right]^{1/2}; \quad (10.2)$$

$$\varpi_e^* = 2\tau + \varepsilon - \Delta y - \{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C] \cdot \xi_v\}^{1/2}; \quad (10.3)$$

$$v_e^* = 2\tau + \varepsilon - \Delta y - 2 \cdot \{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C] \cdot \xi_v\}^{1/2} - \xi_f. \quad (10.4)$$

It is interesting to learn that compromise between an organization and its employees is met establishing organizational equilibrium. It is somehow acceptable if the organizational effort, E, is alike the followers effort, ε , ($E = \varepsilon$). Then the difference of the values (3.11.1 - 4) and (4.10.1 - 4) accordingly is to find the perceived cost of a compromise of a narrowly materialistic leader if organizational equilibrium is met. These formulas of concessions are as follow:

$$\Delta \mu_e^* = \mu_1^* - \mu_e^* = \frac{\varepsilon - \Delta y}{\xi_v} \cdot \left\{ \Delta y^{1/2} - [(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} \right\} < 0; \quad (11.1)$$

$$\Delta\chi_e^* = \chi_1^* - \chi_e^* = \sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ \Delta y^{-1/2} - [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{-1/2} \right\} > 0; \quad (11.2)$$

$$\Delta\varpi_e^* = \varpi_1^* - \varpi_e^* = \Delta y - (\varepsilon - \Delta y) - 2\tau - C - \sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\}; \quad (11.3)$$

$$\Delta v_e^* = v_1^* - v_e^* = \Delta y - (\varepsilon - \Delta y) - 2\tau - C - 2\sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\} < 0. \quad (11.4)$$

It is obvious that

$$\Delta y < (\varepsilon - \Delta y) + 2\tau + C + 2\sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\},$$

whereas $\Delta y < [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]$.

Thus, the negative value of (11.4) proves the idea that organizational equilibrium, once the management and employees' expectation are mutually optimized, is beneficial for implementation of planned change. Thus, the cooperation of parties increased net performance growth. On the other hand, the negative value of (11.1) means that organizational equilibrium requires higher intensity of manipulations from the leader unless the evidence of (11.2) is a clear demonstration of the diminishing of the followers' disobedience rate. It is difficult to judge about gains or losses objective function of the leader (11.3). However, it is to assume that increased intensity of manipulations obviously increases total amount of the leader's consumption, hence the gain in utility incurred owing to better moral of the followers.

Variations in change implementation parameters may alter game state, and its outcomes under an organizational equilibrium. The sensitivity of organizational equilibrium state and outcomes to variations of parameters, in the case of $(\varepsilon - \Delta y) > 0$, and $\delta \geq \alpha + \tau \geq \beta \geq \varepsilon \geq \Delta y \geq \alpha \geq \tau \geq 0$, is given in Table 3.

('+' - positive correlation, and '-' - negative correlation).

Table 3. Sensitivity of organizational equilibrium state to change intervention parameters,

State of change process	Change intervention parameters		
	Variable cost of leader's manipulations, ξ_v	Perceived cost of the followers effort to change, ε	Projected growth of performance within organizational equilibrium, Δy
Optimal intensity of manipulation, μ_e^*	—	+	—
Disobedience rate at optimal intensity of manipulation, χ_e^*	+	—	—
Objective gain at optimal manipulation intensity, ϖ_e^*	—	—	+
Maximum net gain at optimal manipulation intensity, v_e^*	—	—	+

Like in the previous analysis, the appreciation in the leader's consumption price reduces intensity of manipulations, and consequently worsens moral climate in organization which negatively affect on the values of optimal objective gain, and maximum net gain. Increase in perceived cost of the followers' effort to change requires escalation of the intensity of manipulations in order to maintain organizational equilibrium whilst such situation may lead to improvement of the followers' moral. On the other hand extensive manipulations reduce projected gain as well as obtainable net gain. Notwithstanding the ration of the perceived cost of effort and projected growth, the augmentation in the aimed value of change outcomes necessitates

less intensity of the leader's manipulations, and as a result of such cost saving increases organizational gains. Anticipating higher value of progress for the same effort the followers cooperate more honestly in change process than ever before.

Above deliberations about change implementation process have been made based on the assumption that the leader deploys manipulative style of management, i.e. he/she makes an effort being involved in rhetoric in order to persuade the followers for honest cooperation. In other words, the leader introduces incentives to change, material and intrinsic rewards, makes a lot of effort, and expects corresponding return. If objective is not met, he/she intensifies only moral rhetoric maintaining employee relations and communications as penalty on slacking is not assented.

The leader should not confuse choosing monitoring instead of manipulation because of monitoring is compared with inactivity of the leader. Nevertheless, monitoring involves different kind of problems such as evaluating performance of various skills. Therefore, the leader is to be guided not only by economic consideration but by the nature of business he/she is going to manage. Intellectual business environment is better managed through manipulation while mass production and construction kind of works necessitate primarily the monitoring style.

3. CONCLUSION

This work analyzed a change process game when both parties are cooperative. Reciprocity and delusion strategies have been examined, and the benefit of a mutual cooperation has been explained. Comparing various cultural situations and management conditions, the optimal strategy of an altruistic leader in a change management cooperative game has been obtained. It is proved that an organizational equilibrium through mutual consensus recompenses by higher productivity. The sensitivity of organizational equilibrium to alteration of change parameters and hypothetical impacts of specific factors on change cost are analyzed. Comparing manipulation and monitoring management styles, preference criterions have been suggested.

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